AUGUST 1917

THE AGRICULTURAL GAZETTE OF CANADA

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DISTRIBUTION OF EGGS TO THE SCHOOL PUPILS

AGRICULTURAL EQUIPMENT IN PUBLIC SCHOOLS

SCHOLARSHIPS FOR HOUSEHOLD SCIENCE

DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA.

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TO AGRICULTURAL OFFICIALS:

PLEASE FORWARD PROMPTLY TO THE AGRICULTURAL GAZETTE ANNOUNCEMENTS, APPOINTMENTS, RESOLUTIONS AND OFFICIAL REPORTS.

MANUSCRIPT FOR THE FORTHCOMING NUMBER SHOULD REACH THE EDITOR NOT LATER THAN THE 5th OF THE PRECEDING MONTH.

Vol. 4, No. 8

August, 1917

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE

The Agricultural Gazette
of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of
THE HONOURABLE MARTIN BURRELL
Minister of Agriculture

OTTAWA
GOVERNMENT PRINTING BUREAU
1917

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The Agricultural Gazette
OF CANADA

VOL. IV AUGUST, 1917 No. 8

THE AGRICULTURAL GAZETTE of Canada is published monthly, in English and in French, by the Dominion Department of Agriculture. It is not intended for general circulation. A limited number of copies, however, are available to subscribers at $1.00 per annum, or 10 cents per copy.

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THE WORK OF THE AGRICULTURAL INSTRUCTION ACT

UNDER THE AGRICULTURAL INSTRUCTION ACT of 1913 the sum of ten million dollars was set apart to be available during the ten years ending March 31st, 1923. The Act has now been in operation for four years and has contributed the sum of $3,400,000 to the provinces to advance the farming industry. With the year 1917-18 the grants to the provinces reach their maximum, there to remain until the completion of the period.

In the total grant for the four years the provinces have participated as follows:—

Ontario	$993,774.24	Nova Scotia	258,294.05
Quebec	805,414.49	New Brunswick	207,435.13
Manitoba	244,994.02	Prince Edward Island	113,944.69
Saskatchewan	258,329.40	Veterinary Colleges	80,000.00
Alberta	215,681.40		
British Columbia	222,132.58	Total	$3,400,000.00

The purpose of the Act, put briefly, is to assist the provinces by grants of money to carry on educational and instructional work for the benefit and encouragement of agriculture. The framers of the Act were of opinion that education and instruction for the farming community might best be classified under four divisions, and these were the lines of work agreed upon:

(1) The teaching, in the public school, of the first principles of the sciences related to agriculture;

(2) The teaching of more advanced agriculture in agricultural colleges and schools, designed, more particularly, to train teachers, investigators and community leaders;

(3) The carrying on of extension work involving the instruction of farmers by acquainting them with the results of scientific investigation and research; and,

(4) The amelioration of the conditions of rural life, particularly in-so-far as women and children are concerned.

To assist the provinces in working out the programme outlined and for the guidance of those charged with the undertaking, a schedule was prepared at the inception of the work setting forth the objects that would be regarded as coming within the scope of the Act. The objects suggested were numerous and, while keeping within the scheme outlined, they afforded each province an ample opportunity for selection, so as to meet individual needs and requirements.

While any form of work included or indicated in the schedule as intended to give effect to the purpose of the Act might be selected, it was left to the Dominion Minister of Agriculture to decide as to the suitability of the undertakings proposed. To enable him to do so, an outline of each year's work is submitted. If the objects named are regarded as coming within the scope of the Act, and their efficiency and sufficiency are conceded, a formal agreement is entered into whereby a province undertakes to expend the grant for the objects named. Apart from the specific authorization for expenditures contained in the annual agreement, it may be stated, in a general way, that the appropriations cover salaries, expenses and the purchase of such materials and equipment as are regarded as essential to carry out efficiently any line of work agreed upon.

To confer with provincial officials, to advise with them, to inspect the work, to see that the moneys are expended in accordance with the intention of the Act, and to report to Parliament on the proceedings under the Act, are the duties pertaining to the office of Commissioner. In order to get in touch with provincial officials and to observe the work being carried on, visits are made from time to time to all the provinces. Not only is co-operation between the Departments, Dominion and Provincial, promoted in this way, but unintentional departures from the spirit of the Act are avoided. Particularly where changes of Government take place are conferences necessary with incoming officials to insure a full understanding of the purposes of the Act and of the methods by which those purposes may be made effective.

As to the efficiency with which the work has been carried out and as to the quality of the results, it is difficult with so great a range of activities and so wide a field, to speak except in general terms. The conclusions in the main are distinctly favourable. In some few cases, the organization of provincial Departments has not been sufficiently complete to insure the best results. In other cases changes of Government and policy have been limiting factors, while in a number of instances the work has suffered from the loss of trained agriculturists due to the closer inspection and war, and indirectly in other ways from the same cause. More frequent consultation would undoubtedly tend to make the work of some of the provinces more effective and to promote co-operation. The extent of the territory to be gone over and the shortness of the season during which observation is practicable make this difficult, but its importance is such as to justify the increased attention that is being paid to these phases.

The following brief summary of from the total grant. About one-third of the grant, ($245,000) has been devoted to the schools and the work performed by the various provinces will indicate the objects upon which the funds provided by the Federal grant have been expended up to the present time:

In the province of Ontario, the work carried on by the Provincial Department of Agriculture at the time the Act came into effect was for the utmost part educational in its character. The one million dollars contributed by the Federal grant has been employed chiefly in extending existing lines of work, such as that comprising district representative system, in improving facilities in the way of buildings at the Ontario Agricultural College and in promoting the teaching of agriculture in the public schools.

To assist the Department of Agriculture of the province of Quebec to give instruction to the farming population in approved agricultural methods, $492,000 has been allotted colleges of agriculture, and the balance, ($69,000) has been assigned to the teaching of agriculture in academies, rural and normal schools, and to instruction in domestic science in convent schools.

In Manitoba, the Extension Service of the Agricultural College has been largely developed with the moneys supplied by the grant. This service embraces in its activities the district representative system, the boys' and girls' club movement, agricultural short courses, home economics, society supervision and short courses, instruction trains and automobile lecture tours. Other phases of work include the establishment of a permanent farm for the demonstration of general agriculture and fruit-growing.

Saskatchewan divides the grant between the College of Agriculture and the Departments of Agriculture and Education. The teaching staff of the College of Agriculture has been greatly strengthened in order to enable the institution to turn out men well equipped for agricultural leadership. The balance of the grant to the institution promotes College Extension system and research work. The work carried on by the Department of Agriculture includes instruction in creamery work, education in co-operation and marketing and the operation of "better farming trains." The work of the Department ofEducation in respect to the teaching of elementary agriculture and household science is financed by the grant.

The greater portion of the grant to the province of Alberta has been expended on the equipment, operation and maintenance of the three Schools of Agriculture, and household science. The object of these schools is to supply a form of education adapted to the needs of boys and girls from the farm. About five hundred students have passed through the schools since their establishment three years ago.

Federal assistance to agriculture in British Columbia has enabled the Provincial Agricultural Department to greatly extend instructional work among farmers. Demonstrations in field crops and horticulture, dairying, poultry-keeping, silo construction and vegetable growing and storing have been carried out; co-operative variety tests and competitions in production for boys and girls, as well as for their seniors, have been organized. The grant has greatly assisted the work of women's institutes, while the organization of marketing and the extension of publicity have been made practicable. The movement to establish agricultural and domestic science teaching in the schools owed its inception, in 1914, entirely to the influence of the federal grant, which has since defrayed a large part of the cost of the undertaking.

In the province of Nova Scotia, about forty-five per cent of all the work done under the Department of Agriculture, including the Agricultural College may be credited, in-so-far as it is represented by moneys expended, to the Federal grant.

At the time The AGRICULTURAL INSTRUCTION ACT went into effect, there were no facilities in New Brunswick for teaching agriculture. The grant has either provided or equipped Schools of Agriculture, has increased the staff of instructors, promoted the interests of farm women and opened the way for a marked advance in connection with the teaching of elementary agriculture in the schools of the province.

Prior to the passing of the Act, no instructional or educational work had been undertaken in Prince Edward Island, neither had the province any staff of men trained for such work, nor the buildings and equipment necessary to its successful prosecution. Requirements in these respects are now being met to a great extent, while the organization of women's institutes and the extension of agricultural teaching to the public schools are entirely due to the assistance derived from the grant.

PART I

Dominion Department of Agriculture

INFORMATION SUPPLIED BY OFFICIALS OF THE VARIOUS BRANCHES REPRESENTED

THE AGRICULTURAL INSTRUCTION ACT

THE following is the form of agreement entered into by and between the Hon. Martin Burrell, Minister of Agriculture for Canada, and each of the nine provinces of the Dominion, under the provisions of THE AGRICULTURAL INSTRUCTION ACT of 1913, the appropriation to each province and the work to be undertaken by each during the fiscal year ending March 31st, 1918:—

FORM OF AGREEMENT

MEMORANDUM OF AGREEMENT made and entered into by and between the Honourable

Minister of Agriculture for Canada, hereunto authorized by Order of his

bearing date the day

of 19

Party of the First Part;

AND

The Government of the Province of herein represented by the Honourable

for said Province, hereunto authorized by Order of His Honour the Lieutenant-Governor of said Province in Council, bearing date the day

of 19 ,

Party of the Second Part,

WHEREAS, under the terms of THE AGRICULTURAL INSTRUCTION ACT, for the purpose of aiding and advancing the farming industry by instruction in agriculture, there shall be paid out of the Consolidated Revenue Fund of Canada to said Province, during the Fiscal Year ending the 31st day of March, 19 , the sum of

and

WHEREAS, it is provided in said Act that the payment of said moneys shall be conditional upon agreement between the Minister of Agriculture and the Government of said Province as to the terms, conditions and purposes within the meaning of said Act, upon and for which the payment of said moneys is to be made and applied.

NOW, THEREFORE, the said parties have mutually agreed that the said moneys shall be paid upon the terms and conditions and shall be applied to the purposes hereinafter set forth, to wit:—

1. One-half of said moneys shall be paid to said Party of the Second Part by said Party of the First Part on the execution of these presents.

2. The balance of said moneys shall be paid to said Party of the Second Part by said Party of the First Part, from time to time, upon the latter being satisfied that said

moneys have been and are being properly expended for the purposes for which said moneys were paid, as hereinafter provided.

3. The said Party of the First Part shall have at all time the right through such officers of his Department or other persons as he may designate or appoint for the purpose, to inspect any work carried on through the assistance of said moneys and may withhold any further payment on account of the same if, in his opinion, the conditions of this agreement are not being fulfilled.

4. The said moneys shall be expended for and applied to the following purposes, the amount to be expended for each purpose being that set opposite the same, to wit:—

5. Should it hereafter at any time be determined that any of the amounts as aforesaid for any of the foregoing purposes can with advantage be varied, then by mutual consent of the parties hereto the same shall be varied accordingly.

6. The Party of the Second Part shall render to the Party of the First Part such statement of the expenditure of said moneys as may be required from time to time by the said Party of the First Part.

7. It is understood that the moneys granted by this agreement are intended to supplement the amounts devoted to agriculture by the Province itself, and are in no wise to be used for the purpose of curtailing the customary provincial expenditure in aid of agriculture.

IN WITNESS WHEREOF, the said Party of the First Part has hereunto set his hand and the Seal of said Department of Agriculture, at the City of Ottawa, this day of 19 .

AND IN WITNESS WHEREOF, the said Party of the Second Part has hereunto set his hand and the Seal of the said Province, at the City of in said Province, this day of 19 .

APPROPRIATIONS TO THE PROVINCES UNDER THE AGRICULTURAL INSTRUCTION ACT

PRINCE EDWARD ISLAND

A. BUILDINGS ACCOUNT	
1. Agricultural Buildings—Equipment and Maintenance	$2,950.00
B. INSTRUCTION AND DEMONSTRATION	
2. Director and District Representatives	7,900.00
3. Short Courses	250.00
4. Drainage and Soils	500.00
5. Dairying	2,600.00
6. Bee-keeping and Fruit Growing	1,300.00
7. Women's Institutes, Household Science, Short Courses, Grants and Allowances	3,500.00
C. ELEMENTARY AGRICULTURAL EDUCATION	
8. Agricultural Instruction in Public and High Schools, Training Teachers, Allowances, Grants, Maintenance of Rural Science Department, Prince of Wales College	10,500.00
9. Miscellaneous and Contingencies, including clerical assistance	2,249.22
Total	$31,749.22

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which the said publications relate.

NOVA SCOTIA

1.	Colleges and Schools of Agriculture: Capital—Science Building, Construction and Furnishings, Interest and Sinking Fund	$8,000.00
2.	Salaries and Maintenance	23,000.00
3.	Demonstration and Instruction: District Representatives	7,500.00
4.	Short Courses: Demonstration Buildings, Maintenace, Allowances to Students	3,000.00
5.	Dairying	3,500.00
6.	Poultry	1,500.00
7.	Bee-keeping: Educational Work	1,500.00
8.	Drainage: Demonstration and Soil Survey	2,500.00
9.	Soils and Fertilizer Demonstration	500.00
10.	Field Crop Demonstration	2,000.00
11.	Fruit Growing	2,000.00
12.	Women's Work: Institutes and Clubs, Domestic Science Short Courses and Allowances	3,000.00
13.	Entomological Work: Horticultural and Entomological Investigation, and Education re Insect Pests	10,000.00
14.	Elementary Agricultural Education: Agricultural Instruction in Public, High and Normal Schools, Training of Teachers, Allowance and Grants	10,000.00
15.	Schools Children's Exhibits and Competitions	2,000.00
16.	Contingencies and Miscellaneous	1,716.69
	Total	$81,716.69

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which the said publications relate.

NEW BRUNSWICK

A. AGRICULTURAL SCHOOLS

1.	Capital Account: Construction, Equipment, Furnishings, Agricultural and Dairy Schools	$1,000.00
2.	Salaries and Maintenance	3,000.00

B. INSTRUCTION AND DEMONSTRATION

3.	District Representatives	8,000.00
4.	Bee-keeping	500.00
5.	Soils and Drainage	4,000.00
6.	Horticulture	5,500.00
7.	Short Courses	3,500.00
8.	Live Stock	7,000.00
9.	Dairying	4,000.00
10.	Poultry	1,600.00
11.	Fertilizers	3,000.00
12.	Entomology	1,000.00
13.	Young People's Club	2,000.00
14.	Agricultural Societies	4,000.00
15.	Women's Institutes	4,500.00

C. ELEMENTARY AGRICULTURAL EDUCATION

16.	Agricultural Instruction in Public, High and Normal Schools, Household Science, Training of Teachers, Allowances, Grants	9,785.80
17.	School Fairs	1,725.00
	Total	$64,110.80

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which said publications relate.

QUEBEC

A. COLLEGES AND SCHOOLS OF AGRICULTURE

1. Grants and Allowances: Macdonald College, Ste. Anne de la Pocatière, School of Agriculture, Oka Institute	$75,000.00
2. School of Veterinary Science, Building Extension	5,000.00

B. DEMONSTRATION AND INSTRUCTION

3. Breeding: Educational Work in Horse-Breeding, and Cattle-raising	7,000.00
4. Poultry: Instruction and Demonstration	18,000.00
5. Bacon: Instruction	5,000.00
6. Horticultural and Entomological Work	30,000.00
7. Experimental and Demonstration Orchards	5,000.00
8. Dairying, Educational Work in Cheese and Butter	25,000.00
9. District Representatives	40,000.00
10. Seed Selection, Clover Plots and Demonstrations	9,000.00
11. Bee-keeping, Instruction	7,000.00
12. Drainage, Instruction and Demonstration	8,000.00
13. Maple Industry: Maintenance of Schools and Allowances to Students	4,000.00
14. Short Courses, Lectures	9,113.76
15. Experimental Union, Investigation Work, Field Crops	2,000.00

C. ELEMENTARY AGRICULTURAL EDUCATION

16. To Promote the Teaching of Agriculture in Academies, Rural and Normal Schools, Training of Teachers, School Gardens	10,000.00
17. To Promote the Teaching of Domestic Science in Academies and Normal Schools, Grants and Special Lectures	10,000.00
18. School Children's Exhibits and Competitions	2,000.00
	$271,113.76

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which said publications relate.

ONTARIO

AGRICULTURAL COLLEGES AND SCHOOLS

1. Ontario Agricultural College:		
(a)* Buildings, Equipment and Furnishings	$75,000.00	
(b) Salaries and Expenses, Additions to Staff, Maintenance	15,000.00	
		$90,000.00
2. Agricultural School: Capital Expenditure including Land Purchase, Buildings and Equipment, and the services and expenses pertaining thereto		50,000.00

INSTRUCTION AND DEMONSTRATION

3. District Representatives: including Clerical and other Assistance in connection with the Administration	120,000.00
4. Co-operation and Markets: Educational Work in connection with the Marketing of Farm Products, including Organization of Co-operative Societies	4,500.00
5. Demonstration and Instruction in Vegetable Growing	6,000.00
6. Stock and Seed-Judging, Short Courses and Institute Lectures	2,500.00
7. Women's Institute Work, including Courses in Cooking, Sewing, etc.	7,500.00
8. Short Courses for Fall Fair, Field Crop and Poultry Judges: including travelling and living expenses	4,703.26
9. O.A.C. Short Courses for Winners of Acre Profit and Live Stock Competitions, including travelling and living expenses	3,000.00
10. Lectures on Horticulture	800.00
11. Demonstrations with Vegetables and Hardy Fruits in New Ontario	1,000.00
12. Vineland Horticultural Experiment Station: Experimental Work	2,500.00
13. Drainage Work	6,500.00
14. Demonstration Work on Soils	4,500.00
15. Bee-keeping	800.00
16. Instruction and Special Educational Work in Growing and Handling Corn	2,000.00

ELEMENTARY AGRICULTURAL EDUCATION

17. To provide for and to encourage the teaching of Agriculture, Manual Training as applied to work on the farm, and Domestic Science in High, Public, Separate and Continuation Schools and in Universities, to be available for grants, services, expenses and equipment, and travelling and living expenses of teachers, inspectors and others in attendance at short courses or other educational gatherings, and to be paid out on the recommendation of the Department of Education	30,000.00
	$336,303.26

*To complete programme of building decided on in 1912.

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which said publications relate.

MANITOBA

INSTRUCTION AND DEMONSTRATION

1. Killarney Demonstration Farm (maintenance)	$3,000.00
2. Dairy Work: Instruction in outlaying districts; grading of products for instructional purposes	8,000.00
3. Poultry Work	4,000.00
4. District Representatives	17,000.00
5. Boys' and Girls' Clubs	17,000.00
6. Short Courses in Agriculture	19,113.11
7. Home Economics: Instruction in Domestic Science including Short Courses	17,000.00
8. Soil Analysis and Survey	1,000.00
9. Bee-keeping	2,000.00
10. Miscellaneous	1,000.00
	$89,113.11

Allotment for 1917-18	$77,113.11
Unappropriated balance from 1916-17	12,000.00
	$89,113.11

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, may be charged against the sub-division to which said publications relate.

SASKATCHEWAN

A. COLLEGE OF AGRICULTURE

1. Staff: Salaries, Research and Extension Service	$22,076.16
2. Women's Work: Homemakers' Clubs	5,500.00

B. INSTRUCTION AND DEMONSTRATION

3. Co-operation and Marketing	4,500.00
4. Animal Husbandry: including Veterinary Instruction	4,500.00
5. Dairying	4,800.00
6. Field Husbandry and Weed Control	5,000.00
7. Demonstration Trains	4,776.16
8. District Representatives	2,500.00
9. Veterinary Short Courses	500.00

C. ELEMENTARY AGRICULTURAL EDUCATION

10. Agricultural Instruction in Public, High and Normal Schools; Household Science; Training of Teachers; Nature Study; School Gardens	25,000.00
11. School Fairs	2,576.16
	$81,728.48

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which said publications relate.

ALBERTA

A. SCHOOLS OF AGRICULTURE

1. Maintenance, Salaries, Expenses	$35,000.00
2. Equipment	2,000.00

B. INSTRUCTION AND DEMONSTRATION

1. Demonstration Farms: Buildings, Purchase of Stock	8,000.00
2. Demonstration Trains	5,000.00
3. Dairying: Dairy Competitions and Prizes	1,500.00
4. Publicity: Printing and Publication of Bulletins	2,400.00
5. Women's Work	4,500.00
6. District Agents	8,500.00
7. Miscellaneous	65.62
	$66,965.62

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which the said publications relate.

BRITISH COLUMBIA

A. INSTRUCTION AND DEMONSTRATION

1. Agricultural and Horticultural Instructors and District Representatives	$3,500.00
2. Field Crop Demonstration Stations	8,000.00
3. Horticultural Demonstration Stations	3,000.00
4. Poultry Demonstration Stations and Egg-laying Contests	1,500.00
5. Alfalfa Plots	500.00
6. Silo Demonstrations	3,000.00
7. Drainage Demonstrations	1,000.00
8. Seed Distribution and Co-operative Variety Tests, Seed Production, Seed Fairs	5,500.00
9. Dairying: Cow-testing Associations	3,000.00
10. Bee-keeping	2,500.00
11. Field Crop Competitions	2,000.00
12. Boys' and Girls' Clubs	1,000.00
13. Fruit-packing Schools and Demonstrations	1,000.00
14. Market Work	4,500.00
15. Agricultural Journal; Publications Branch	5,000.00

B. INVESTIGATION AND RESEARCH

16. Pathological and Entomological Investigation and Research	2,000.00
17. Weed Investigation and Survey	1,500.00

C. ELEMENTARY AGRICULTURAL EDUCATION

18. Agricultural Instruction in Public, High, and Normal Schools, Household Science, Training of Teachers, Grants	20,000.00
19. Contingencies and Miscellaneous	699.06
	$69,199.06

Each appropriation may include services, expenses and equipment.

NOTE:—Cost of preparing and printing bulletins and circulars, if undertaken, to be charged against the sub-division to which said publications relate.

RECAPITULATION OF APPROPRIATIONS

	1913-14	1914-15	1915-16	1916-17	1917-18
Prince Edward Island	$26,529.85	$27,832.81	$29,138.28	$30,443.75	$31,749.22
Nova Scotia	54,288.45	61,144.45	68,001.87	74,859.28	81,716.69
New Brunswick	44,509.93	49,407.20	54,308.40	59,209.60	64,110.80
Quebec	159,482.40	187,409.16	215,310.70	243,212.23	271,113.76
Ontario	195,733.32	230,868.83	266,013.64	301,158.45	336,303.26
Manitoba	51,730.05	58,075.45	64,421.31	70,767.21	77,113.11
Saskatchewan	54,296.29	61,152.31	68,011.04	74,869.76	81,728.48
Alberta	46,094.95	51,310.41	56,528.82	61,747.22	66,965.62
British Columbia	47,334.76	52,799.38	58,265.94	63,732.50	69,199.06
Veterinary Colleges	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
Total	$700,000.00	$800,000.00	$900,000.00	$1,000,000.00	$1,100,000.00

THE DOMINION EXPERIMENTAL FARMS

THE DIVISION OF HORTICULTURE

PLANT-BREEDING WORK AT THE CENTRAL EXPERIMENTAL FARM

BY A. J. LOGSDAIL, B.S.A., ASSISTANT IN PLANT BREEDING

THE work in plant improvement in the Horticultural Division of the Central Experimental Farm is necessarily limited to a few crops of prior importance. At present the work is chiefly confined to the production of early-maturing strains of sweet corn and tomato and the selection of types for yield and quality with such crops as peas and beans. Plant improvement work is also being carried on with tree and bush fruits and during the past season some promising gooseberry seedlings have fruited, these seedlings resulting from an original cross between the English gooseberry, *Ribes Grossularia,* and the native species of *Ribes Cynosbati* and *Ribes oxyacanthoides.* A number of the bushes are yielding medium large to even large fruits, though the best quality has, so far, been found on two bushes bearing medium to medium small sized fruits.

A VIEW OF THE BREEDING PLOTS. SELECTIONS OF PEAS IN THE FOREGROUND, STRAINS OF SWEET CORN IN THE REAR

Some promising strawberry seedlings have been secured from crosses previously made between our native species, *Fragaria virginiana,* and several of the cultivated varieties that have succeeded best at Ottawa. The ideal, or object, in strawberry work is to secure, if possible, a variety yielding fruit as large as the average commercial strawberry, but, at the same time, possessing the sweetness, texture and aroma of our wild species.

In outlining the work now being carried on in plant breeding in this Department, it might be well briefly to describe the different methods that have been employed in producing the Early Malcolm sweet corn and the Alacrity tomato, two varieties that have been sent out from Ottawa and very favourably commented upon by our experimenters.

Corn being a wind-pollinated crop the breeding of it cannot be successfully carried out by individuals located where a number of varieties or types of corn are grown, as cross pollination is liable to spoil much of the work attempted. Several seasons ago the Early Malakoff sweet corn was subjected to close selection and different types were

"ZUCKERBIRN" HARDY PEAR OF RUSSIAN ORIGIN, EMPLOYED IN THE PEAR-BREEDING WORK AT THE CENTRAL EXPERIMENTAL FARM isolated. Types similar to one another were inbred for a season and then employed for intercrossing with strains of similar character. This method was employed with the object of maintaining the vigour of the variety. At the time the type selection work on Early Malcolm was undertaken a number of crosses between Early Malcolm and early maturing types of flint and dent corns were also made. From these crosses several promising combinations were secured, the native Squaw corn producing a number of very early maturing sweet types. These recessives are now being tested and give promise of producing some valuable stock.

DWARF POT-GROWN APPLE TREE, WITH BLOSSOMS CROSSED AND ENCLOSED IN PAPER BAGS TO PREVENT MISCELLANEOUS AND UNDESIRABLE CROSSING

Tomato breeding was undertaken by combining the methods of individual plant performance with that of mass selection. These may briefly be described in the following manner:

Several hundred plants were individually recorded for yield, earliness of crop, quality of crop, size of fruit and vigour of plant growth. From these plants the ten best were selected for future work. The next season one hundred plants of each of these ten individuals were grown and the recorded performance of each plot made with regard to the same characteristics as those recorded for individual plants. At the same time ten small plots of some twenty plants in each were grown and crosses made between the most promising strains. Full data had thus been secured of the seed saved from these several selections. The following season some twelve hundred plants were grown for records of individual plant performance. An early fruiting type of good quality has been secured and the work now consists of growing a number of plots of the best strains of this selected strain, from which a quantity of seed is saved each year and is distributed to experimenters throughout the country.

The crop that perhaps lends itself most readily to plant improvement is that of the garden pea. As it is almost totally self-fertile (natural crosses rarely occurring) anyone interested in the growing of the garden pea can improve any variety, for which he may have a particular liking, by the simple method of plant selection. Briefly described the method employed here is that of growing several hundred plants of a variety, the seed being planted four to six inches apart. The crop is grown and allowed fully to mature. The plants are then sorted according to the number of pods on each. The twenty best plants are shelled and the plants possessing the heaviest crop of dry shelled peas are chosen as the stock from which to raise the following crop. This method has been followed for a number of years with marked improvement of the original stock chosen. These selected types are being crossed with the object of combining the desirable characteristics of one variety with those of another and producing some new varieties that will fulfil the requirements of certain local markets better than is now done by the varieties generally grown. As an instance it might be cited that the Gradus pea is very extensively grown commercially, but as a variety cannot be considered a heavy-yielding type of pea. Its large pod and pea make it an attractive product, yet a pea with the yielding quality of the English Wonder or McLean Advancer, possessing at the same time the characteristics of the Gradus type, would be a very much more profitable pea to grow. With this object in view a number of crosses have been made between these varieties and the progeny are now under test.

Tree fruits have received and are receiving a good deal of attention, but the results from this work take a number of years to show themselves, and as the work on plums and pears was only initiated some four years ago, results will not be obtained for some time to come. In apples a large number of very fine seedlings have been produced by the Dominion Horticulturist. These are now being tested in the orchards and several trees of distinct commercial value have been produced, as well as a number of others possessing a quality and appearance of fruit that make them well worthy of a place in any private fruit garden where dessert quality is the first requisite.

HYBRID APPLE TREE IN BLOSSOM, THE PROGENY OF A CROSS BETWEEN PYRUS BACCATA x P. MALUS

The work of improving the quality of our horticultural crops is very urgently needed. In this work the greatest assistance can come from that large army of amateur horticulturists throughout the country, the possessors of small gardens in which they are able to give the closest personal attention to anything that may particularly attract them. It is from this class of horticulturists, more than from any other, that striking instances of plant improvement in fruits, flowers and vegetables have been produced from time to time both on this continent and in Europe. The commercial or professional horticulturist cannot work towards an ideal, especially in the matter of the improvement of flowers, with as free a hand as can the amateur in his own garden with a crop of his own choice.

THE DAIRY AND COLD STORAGE BRANCH

LOSS OF FAT IN THE WHEY WHEN USING PEPSIN

BY GEO. H. BARR, CHIEF, DAIRY DIVISION

OWING to the scarcity of rennet extract in Canada in 1916, many of the cheesemakers were obliged to use pepsin as a substitute. It was generally admitted at the end of the season that there was a greater loss of fat in the whey when pepsin was used than there was when using rennet extract.

Considerable work was done at the Finch Dairy Station between February 23rd and May 10th, 1917, endeavouring to eliminate this extra loss of fat. Tests were made with different quantities of pepsin, setting the milk at different temperatures and developing a higher acidity in the milk before setting than is commonly practised. In preparing the pepsin solutions, one pound of pepsin was dissolved in one gallon of water.

The following results will be of interest to dairy officials throughout Canada:

TABLE I—SHOWING THE LOSS OF FAT IN THE WHEY FROM SETTING THE MILK AT 85 TO 86 DEGREES TEMPERATURE—CURDS IN THE WHEY OVER 2 HOURS AND 15 MINUTES

COAGULANT USED	Number Vats	Setting Temperature	Per Cent Fat in Whey
		Degree	
Armour's Pepsin	21	85.7	.225
Curdalac	12	85.5	.217
Cudahy's Granular Pepsin	3	85.3	.191
Cudahy's Liquid Pepsin	1	85.0	.230
Renzyme	3	85.1	.196
Hansen's Rennet	7	85.5	.197
Videon's Rennet	4	85.2	.170
Tousignant's Rennet	1	86.0	.250
Average of vats set with pepsin	40	85.3	.218
Average of vats set with rennet	12	85.5	.209

TABLE II—SHOWING THE LOSS OF FAT IN THE WHEY FROM SETTING THE MILK AT OVER 86 DEGREES TEMPERATURE—CURDS IN THE WHEY OVER 2 HOURS AND 15 MINUTES

COAGULANT USED	Number Vats	Setting Temperature	Per Cent Fat in Whey
		Degree	
Armour's Pepsin	11	88.1	.251
Curdalac	2	90.5	.242
Cudahy's Granular Pepsin	2	87.5	.225
Cudahy's Liquid Pepsin	1	87.0	.280
Hansen's Rennet	1	87.0	.230
Videon's Rennet	2	89.5	.240
Hansen's R. P.	1	88.0	.300
Average of vats set with Pepsin	16	88.2	.249
Average of vats set with rennet	4	88.5	.252

TABLE III—SHOWING THE LOSS OF FAT IN THE WHEY FROM MILK DIVIDED INTO DIFFERENT VATS AND SET AT DIFFERENT TEMPERATURES

COAGULANT USED	Number Vats	Setting Temperature	Per Cent Fat in Whey
		Degree	
Armour's Pepsin	2	90.5	.215
Armour's Pepsin	2	85.0	.182
Curdalac	2	90.5	.242
Curdalac	2	85.0	.210
Average of vats set at high temperature	4	90.5	.228
Average of vats set at low temperature	4	85.0	.196

TABLE IV—SHOWING THE LOSS OF FAT IN THE WHEY FROM MILK SET AT 85 AND 86 DEGREES TEMPERATURE AND A HIGH ACIDITY

COAGULANT USED	Number Vats	Setting Temperature	Per Cent Fat in Whey
		Degree	
Armour's Pepsin	6	85.7	.276
Curdalac	2	85.5	.340
Cudahy's Granular Pepsin	3	85.7	.222
Hansen's R. P.	1	86.0	.215
Average of all vats	12	85.7	.268

TABLE V—SHOWING THE LOSS OF FAT IN THE WHEY FROM MILK SET AT OVER 86 DEGREES TEMPERATURE AND A HIGH ACIDITY

COAGULANT USED	Number Vats	Setting Temperature	Per Cent Fat in Whey
		Degree	
Armour's Pepsin	5	88.0	.302
Curdalac	1	87.0	.330
Average of all the vats	6	87.8	.306

TABLE VI—SHOWING THE LOSS OF FAT IN THE WHEY WHEN USING DIFFERENT QUANTITIES OF COAGULANT IN THE SAME MILK DIVIDED INTO DIFFERENT VATS

COAGULANT USED	Number Vats	Setting Temperature	Coagulant per 1,000 lb. Milk	Per Cent Fat in Whey
		Degree	Oz.	
Armour's Pepsin	1	85.0	5.5	.180
Armour's Pepsin	1	85.0	4.0	.205
Curdalac	3	85.0	6.0	.163
Curdalac	3	85.0	4.0	.183
Averages from large quantities of pepsin.	4	85.0	5.75	.171
Averages from ordinary quantities of pepsin	4	85.0	4.0	.194

SUMMARY OF ALL THE VATS FROM FEBRUARY 23RD TO MAY 10TH AT THE FINCH DAIRY STATION

COAGULANT USED	Number Vats	Time in Whey		Setting Temperature	Coagulant per 1,000 lb. Milk	Per Cent Fat in Whey
		Hr.	Min.	Degree	Oz.	
Pepsin, ordinary temperature	40	2	57	85.3	4.55	.218
Pepsin, high temperature	16	2	47	88.2	4.29	.249
Rennet, ordinary temperature	12	2	50	85.5	4.80	.209
Rennet, high temperature	4	2	47	88.5	5.37	.252
Pepsin, high acidity Low temperature	12	2	05	85.7	3.94	.268
Pepsin, high acidity High temperature	6	1	55	87.8	4.50	.306
Vats set high temperature*	4	2	29	90.5	4.31	.228
Vats set low temperature*	4	2	29	85.0	4.25	.196
Extra pepsin*	4	3	08	85.0	5.75	.171
Normal pepsin*	4	3	08	85.0	4.00	.194

*Same milk divided into different vats.

CONCLUSIONS

Summing up all the tests made between February 23rd and May 10th, we would say that in using pepsin, the best results were secured by setting at a temperature of 85 degrees and using enough pepsin to coagulate the milk ready to cut in from 25 to 30 minutes. Setting the milk at temperatures over 86 degrees increased the loss of fat in the whey in nearly every case.

The loss of fat in the whey was lessened by increasing the quantity of pepsin per 1,000 pounds of milk from 4 ounces to 5.5 and 6 ounces.

Developing the acidity in the milk so that the curds dipped in less than 2 hours and 15 minutes from time of setting, increased the loss of fat in the whey to a marked extent.

It was found advisable to allow the curd to get fairly firm before cutting, but there was no advantage in letting it get overly firm.

In some cases the whey from milk set with pepsin tested lower in fat than the whey from milk set with rennet extract. It seems, however, that varying conditions in the milk from day to day as found in everyday factory work affect the loss of fat in the whey to a greater extent when pepsin is used than when rennet extract is used. Therefore, the greatest care must be exercised in cutting the curd and stirring it while cooking when making cheese with pepsin.

THE ENTOMOLOGICAL BRANCH

THE RELATION OF SOIL INSECTS TO CLIMATIC CONDITIONS

BY ALFRED E. CAMERON, M.A., D.Sc., ENTOMOLOGICAL BRANCH

INTRODUCTION

WE may take it as a general rule that the conditions in the soil which are most favourable to plant life are also those which are most beneficial to the vital processes of all animal organisms which have made it their habitat, whether spending their whole life in or on the soil or leading a subterranean existence only during one or more of their metamorphic periods, as is the case with many insects.

In a consideration of the interrelationships which exist between soil insects and the physical factors of their habitat, the vegetational aspect must not be minimized. Phytophagous species predominate over those that are predacious, and where other conditions are favourable, the food plant is a very significant, determinative agent in the constitution of the insect fauna of any region, whether subterranean or aerial. Practically speaking, the fundamental principles underlying the science of economic entomology, have been established by attention being paid to this very fact. According as climatic conditions allow, entomologists may rather accurately prophesy what genera and sometimes species of insects are likely to exact toll on the cultivated crops of any one district. Climatic factors play an important part in determining the distribution of species.

The insect pests of any particular crop together with their parasites and predators, constitute a well-defined community wherein several environmental factors influence their welfare. The oscillation of any one of these factors may tend to exert a beneficial or injurious effect upon the component insect species, and the greater the swing of the pendulum the greater the resulting benefit or injury. At present, it is not possible with the data at hand to relegate to any one climatic factor, except in a very general way, its influence as a destructive or constructive associational agent, but it is a very well-known fact that the variations of the intensities of insect activities can be correlated with environmental changes as much as any other natural phenomenon.

A series of favourable occurrences will, for instance, cause the rapid increase of an insect species which may, so far as the agriculturist is concerned, have been a negligible quantity in his estimation of the operations which demand his attention. It should, therefore, be the aim of the economic entomologist to decide the causes of what is designated a "serious outbreak", and, if these causes can be eliminated or controlled, to recommend the prophylactic method which is most consonant with economy. A case *à propos* of the relationship of the environment to the insect may be cited, occurring in the province of British Columbia in the past year. Until recently, the pear thrips, *Taeniothrips pyri* Dan, had not been recorded from regions further north than the Sacramento Valley of California on the Pacific Coast. Apparently, it made its appearance in the orchards of Vancouver Island as a serious pest. From information elicited from the orchardists concerned, it was learned that the actual introduction of the species must have taken place several years ago; but only within the last two years has its numbers assumed such proportions as to attract attention. The reason perhaps is that during the first years of its introduction into the province, it encountered one or more natural checks. With the probable removal of these, or loss of their effectiveness through the species adapting itself to its surroundings, it multiplied so quickly as to assume an alarming aspect. It is quite a feasible argument to suppose that the lower soil temperatures which prevail in the more northerly latitudes, served at first as a competent restraint on its natural tendency to increase. Hence its presence was in all likelihood overlooked. Or, it may be that this species which spends eight to nine months in the soil in the larval and pupal stages, was controlled by the excessive droughts which often prevail in the summer in that part of Vancouver Island to which it is at present confined. Gradually, however, a species may adapt itself and become inured to changed conditions, although at first reacting negatively towards them. If, as may be argued, the species is indigenous to the province—and its discontinous distribution would appear to controvert this fact—the interpretation of the abnormal recent increase of its numbers would still be in accord with our theories of climatic influence.

It will be readily foreseen from the foregoing that it devolves upon the entomological ecologist to make accurate measurements of the climatic factors, if the study is to pass beyond the merely descriptive stage and be enumerated among the more exact sciences.

The factors which exert a profound influence upon soil insects, are more or less well known. Most important are, temperature, humidity, soil texture and structure, soil ventilation including soil gases, and barometric pressure. The best index of these factors is the evaporating power of air, which depends more or less closely upon air currents and temperature. It is measured by means of the porous cup atmometer. The intensity of light is another factor which cannot be neglected.

RESPONSE TO LIGHT

Very few soil insects are other than negatively phototropic. In illustration, of this fact, it is only necessary to make mention of the retiring habits of species of various families which include insect denizens of the soil. Among these are numbered the various species of Forficulidae, larvae of Noctuidae and Hepialidae, larvae and adults of Carabidae, Staphylinidae and Silphidae, larvae of Scarabaeidae, Elateridae, Telephoridae, Lampyridae and Rhynchophora, soil-inhabiting larvae of various dipterous families, examples of which are represented variously among Cecidomyiidae, Mycetophilidae, Bibionidae, Tipulidae, Stratiomyiidae, Leptidae, Therevidae, Dolichopodidae, Asilidae, Tabanidae, Muscidae, Anthomyiidae and Sapromyzidae. The great majority of the apterygote Thysanura and Collembola avoid direct sunlight, but the species *ambulans* L. and *fimetarius* L. of the genus Onychiurus (Lipura) are positively phototropic, or, at least, do not always react negatively to sunlight.

It may be that as the intensity of light varies, the animals respond in a definite manner. How far this factor operates, has not been investigated to any great extent. In the case of predacious insects inhabiting the soil the response to the stimulus of light may be overruled when the animal is hot on the scent of its prey. For instance, many species of Carabidae and Staphylinidae, which may be regarded as typical soil Coleoptera, frequenting the recesses of the soil at all times, often hunt their prey *en plein soleil.*

RESPONSE TO ATMOSPHERIC PRESSURE

In mountainous regions, as one ascends, the barometric pressure gradually diminishes. It is probable that, correlated with this fact, is the association of certain species with lower or higher altitudes. A few species have been captured on the summit of Mt. Cheam of the Coast Range, British Columbia, 8500 feet high, notably *Pangonia fera* Will. and *Tabanus comastes* Will., the latter taken in copulation once by my colleague Mr. R. C. Treherne, indicating that the species was not far distant from its true habitat or breeding ground. *T. comastes* according to Dr. S. Hadwen, of Agassiz, B.C., is also quite common on lower altitudes, and, similarly *T. sequax* Will., taken by him at altitudes ranging from 4000-5000 feet, to as low as 2000 feet. Similarly, numerous examples of Lepidoptera seem to frequent mountainous regions. *Erebia vidleri* El. occurs commonly on the summit of Mt. Cheam and also *Oeneis norna* var *beanii* El. The varied experiences of entomological collectors could greatly multiply the examples of forms frequenting the upper reaches of high mountains

The indications are strong that there is some affinity between the presence of these forms and atmospheric pressure, and future investigation, it is hoped will show the extent of this relationship Soil-inhabiting insects are just as likely to respond to this factor as aerial forms, since there is unbroken continuity between soil and atmospheric air.

CONSIDERATION OF THE EVAPORATING POWER OF AIR

In regard to evaporation and its effects upon animals, Shelford in his "Animal Communities in Temperate America" (Chicago, 1913) gives a fairly representative summary of our present knowledge of this phenomenon. In his definition, quoting Hann, ("Handbook of Climatology", New York, 1913, p. 72), he states that the total effect of air temperature, pressure, relative humidity and average wind velocity upon a free water surface in the shade or in the sun is expressed by the amount of water evaporated. We have no hesitation in supporting his assumption that, as a physical index of the varied conditions which control an organism, the evaporating power of air is supreme to any other As this author indicates (p. 162), however, different climatic conditions will cause variations of the individual factors, and, for this reason, records of light, temperature and pressure, amount of carbon dioxide, etc., should be made. As an instance of the response to variation of evaporating power Shelford—*loc. cit.*, p. 163) proceeds to state that a high rate of evaporation is not equally advantageous or injurious to all animals, and instances the case of such amphibians, insects and millipedes, which frequent dense woods and react negatively to an atmosphere of high evaporating power. Inversely, those animals which inhabit dry, sandy areas, thrive best in air of high evaporating power. Necessarily, as the author remarks, the power of resistance of an animal exposed to an atmosphere of high evaporating power, to which it responds negatively, will vary as the thickness of its integument or protective covering.

RESPONSE TO TEMPERATURE

That there is an undoubted relationship between the various life-processes of insects and the temperature of their habitats, is now supported by a large body of opinion. Workers who have been active in this field, are numerous and include such well known experimentalists as Headlee, Sanderson, and Dean in

America and Bachmetjew in Europe, the last of whom has produced a monumental record in his "Experimentelle Entomologische Studien".

For every species of insect there is probably an optimum temperature of development at which the physicochemical reactions resulting in growth and metamorphoses, proceed most favorably. A great deal of practical work has been accomplished in this field, and some attempt has been made to correlate temperature not only with insect development but with the phenomena associated with hibernation, aestivation, reproduction and mortality. Sanderson in his paper on "The Relation of Temperature to the Growth of Insects" (*Jour. Econ. Ent.*, vol. iii, p. 114), discusses the much debated "thermal constant" or uniform accumulation of temperature for the various stages of insect growth. This author is probably correct in saying that the relation of temperature to growth phenomena is perhaps different for each species and might be expressed by a curve, the abscissae of which represent degrees of temperature and the ordinates the time factor. He further asseverates that although a fairly constant "total effective temperature" for any given phase of an insect's life or activity may be secured for the summer months, when there is a fairly constant mean temperature, such an accumulation will have no meaning in regard to the same phenomena in spring or autumn when the temperatures are more variable. This will be readily understood when one considers the increased time and, therefore, increased accumulation required by the second and succeeding generations of many insects with two or more generations per year. For example, most insects which hibernate as larvae or pupae require a much longer period, as a rule, to complete their transformations in the preimaginal stages than the same species would require for the same phases in summer. Many Anthomyiidae, e.g. *Pegomyia hyoscyami* Panz, which under normal conditions in England will pass though the pupal period in about 17 days, have been known by the author to hibernate as puparia in the soil for as long as 114 days ,(see "A Contribution to a Knowledge of the Belladonna Leaf-Miner, *Pegomyia hyoscyami* Panz, *Ann. App. Biol.*, vol. I, 1914, p. 61). Several parallel cases could be cited.

There is no physiological fact more important than the temperature relations existing between fauna and habitats. Among soil insects the admissible range of variation of temperature may be quite considerable without exerting any injurious effect upon the various species. As a general rule, high temperatures have a decidedly stimulating effect which is reflected in the more intense activities of insects in summer. During winter the low temperatures, on the other hand, induce torpor and passivity. At this season soil insects seek their hibernating quarters, and surface frequenters may entrench themselves deeply to escape the cold.

Much of the seasonal variation in the appearance of various insect species may be attributed to abnormal changes of temperature from season to season. Fuller investigation along this line would be productive of very interesting results. The physiological processes of insect life which result in metamorphoses are, as we have already noticed, essentially dependent on temperature. The katabolism and anabolism involved in histolytic changes depend upon the antecedent creation of a certain molecular swing which is only imparted by the stimulus of the effective temperature. That these facts have a practical significance in regard to the seasonal appearance and reappearance of injurious insects cannot be doubted. Three years ago the author in a paper entitled "General Survey of the Insect Fauna of the Soil" (*Jour.

Econ. Biol., vol. iii, pat. 3), stated (p. 195) that "varying weather conditions have an important bearing on various insect pests which vary in their prevalence from year to year." Of course, we do not forget that the intervention of insect parasites has an important function in preserving the balance of nature. In the passage just quoted the hope was also expressed that "definite meteorological observations carried out in association with entomological investigations, would solve many of the problems relative to this phenomenon". In the interim, the author has encountered no argument sufficiently powerful to alter this opinion.

It is important to bear in mind in tabulating the records of soil temperatures, that the kind of soil should always be indicated. It is well known that peaty and other dark soils absorb heat, while pale clayey, chalky and other soils reflect it. Schübler, quoted by Woodward ("Geology of Soils and Substrata", London, 1912, p. 92), estimated the power of soils in retaining heat as follows: calcareous sand, 100; siliceous sand, 95; sandy clay, 76; loamy clay, 71; stiff clay, 68; grey clay, 66; humus, 49. This same author goes on to state (*loc. cit.*, p. 93) that "the scorching effect of the sun on grass in areas on gravel as compared with similar areas on clay is very noticeable. During the prolonged drought of 1911 in Great Britain, the inability of the sun to penetrate the clay was proved by an experiment on August 9, which was the hottest day with a shade temperature of 96° F. It was then found that 6 inches below the surface the temperature of the earth was no more than 76° F."

Such facts as these will have to receive close attention in the interpretation of soil-temperature records. It is essential that in a study of the insects of any particular type of soil, the investigator should make his own records and not base his conclusions upon those made in another locality with, perhaps, a quite different type of soil, exhibiting a different range of temperature. For comparative study the utility of these records will not be denied, and in time, with a sufficiently large body of enthusiastic workers, we may be sanguine enough to hope that adequate records of all the more important climatic factors will be acquired in different regions of the continent.

Many of the facts which have been definitely established by the soil physicist, have proved most useful to the ecological botanist and zoologist. The student of soil insects must remember that the temperature of the soil and subsoil is by no means uniform but varies irregularly with depth. Hence, records of temperature 3 inches below the surface would bear but little relation to the behaviour of those species which burrow more deeply. The great majority of soil insects, however, pursue their activities at a depth not exceeding 6 inches, and throughout these 6 inches the variation of temperature is very small, depending on whether the soil is cultivated or overgrown with vegetation. Due allowance must always be made for the species which penetrate further down either normally or only for special purposes, such as hibernating.

INFLUENCE OF SOIL MOISTURE

To what extent soil water determines the physiological processes of terrestial animals has not been fully ascertained. Certain it is that of the three forms of soil moisture, namely gravitational, capillary, and hygroscopic, the first is probably most destructive of insect life, while the second is perhaps the most important in maintaining the proper humid conditions for the prosperity of the soil fauna. The third form, on account of its infinitesimal amount, is practically negligible in its effects upon the vitality of soil insects. Mortality among them is greatest in winter and spring, when the accumulation of gravitational water is at its maximum. Again, these are the seasons when most soil insects have assumed the susceptible larval and pupal stages. Even where larval and pupal forms can withstand protracted periods of submersion without being seriously inconvenienced, very few were found that can survive the continued absence of air expelled from the flooded, soil pore-spaces. It has been frequently observed by the author that clay soils are less productive of insect species than any other. The reason for this is perhaps dual. In the first place the tenacious, unyielding nature of the clay renders it more or less impervious to burrowing forms, unless it be sunbaked and cracked. At least, their activities are seriously interfered with. Secondly, the percolation of gravitational water through clay is very slow owing to the smaller pore-spaces. In other words, a clay soil is very retentive of moisture and drains exceedingly slowly.

At the other extreme, the complete lack of moisture in a soil owing to prolonged drought, would prove fatal to many soil insect species. At any rate, it has the effect of driving the more active forms to greater depths, which return again to the surface when capillary attraction is re-established in the soil by a renewed rainfall. This is often exemplified in the marked appearance and disappearance of soil-inhabiting Collembola. Larvae of Carabidae and Elateridae will penetrate quite deeply in order to secure the necessary moisture conditions.

Fossorial wasps always choose a light sandy soil for their operations. They burrow down to a depth where the sand is likely to retain sufficient moisture to lend stability to their underground galleries and larval chambers. Their choice would seem to be determined by the light texture and consequent easy excavation of the soil. But consideration of the moisture factor also enters into the question; otherwise, the soft bodied larvae would run grave risks of dessication. In this connection, temperature undoubtedly plays an important role when it is remembered that, in summer, a sandy soil registers at the surface a few more degrees of temperature than any other. Sand, however, differs from clay in that the warmth does not penetrate so readily.

RESPONSE TO SOIL GASES

The ventilation of soils is a factor which has been almost neglected in soil insect investigations. The aeration of a soil depends more or less on its texture and capacity for heat. Loose, open soils are subject to peculiarly thorough breathing, while all close-textured soils, such as the heavy and stiff clays, are very deficiently ventilated. High temperatures, by stimulating the more rapid diffusion of gases, aid in a more perfect soil aeration. In the soil, the presence of oxygen is essential for all forms of life, no less than for those species which frequent more open habitats. Soils which are rich in humus, usually contain an excess of carbon dioxide, consequent on the disintegration of complex, organic compounds, with liberation of this gas. It would be interesting to measure the effect of this and other soil gases on the constitution of the soil fauna. At least soil gases must be allowed due consideration in any study relating to soil insects.

CONCLUSION

So far as the author interprets the chain of evidence which links up the environmental factors to the composition of the soil insect fauna, the facts may be briefly stated as follows. The flora of a district depends on the type of soil, its structure texture and composition, temperature and rainfall. Soil insects of phytophagous habits frequent those soils where their food plants thrive, provided other external conditions are also suitable. These phytophagous species again, account for the presence of their insect predators. A change in any one of the factors constituting a habitat, will have an important influence in changing the facies of the fauna, tending to give rise to successional phenomena. On the other hand, a species may be more or less able to adjust itself to environmental changes, provided they are not too abrupt nor drastic. In this respect some species are more plastic than others.

THE LIVE STOCK BRANCH

THE RECORD OF PERFORMANCE

BY C. S. WOOD, CHIEF INSPECTOR, RECORD OF PERFORMANCE

DURING the past year feed conditions were so bad that the owners of dairy cattle, in a great number of instances did not know how they were going to feed their cows during the winter. Under these circumstances it is not to be wondered at that there should have been a slight falling off in the number of cows entered for the Record of Performance test.

The following is a brief summary of the year's work:

AYRSHIRE COW "JEANNETON" 13358
Produced at 15 years of age, 14,150 lb. milk; 575 lb. fat

NUMBER OF COWS ENTERED FOR R. O. P. TEST

Ayrshire	656	Decrease as compared with last preceding year	21
French-Canadian	44	Increase “ “ “ “ “ “	1
Guernsey	27	“ “ “ “ “ “ “	8
Holstein	628	Decrease “ “ “ “ “ “	86
Jersey	192	“ “ “ “ “ “ “	6
Shorthorn	137	Increase “ “ “ “ “ “	16
Total	1,684		

NUMBER OF COWS QUALIFIED

Ayrshire	223.	Increase as compared with last preceding year	48
French-Canadian	14.	“ “ “ “ “ “ “	6
Guernsey	8.	“ “ “ “ “ “ “	1
Holstein	221.	Decrease “ “ “ “ “ “	12
Jersey	64.	Increase “ “ “ “ “ “	7
Shorthorn	50.	“ “ “ “ “ “ “	16

HOLSTEIN-FRIESIAN COW “PLUS PONTIAC ARTIS” 16792

Following are the names, records and owners of highest butter-fat producing cows in each of the breeds and classes:

AYRSHIRE

Mature:

“Lady Jane” 30886, 19,405 lb. milk; 786 lb. fat. Owned by A. S. Turner & Son, Ryckman’s Corners, Ont.

Four-year-old:

“Milkmaid of Orkney” 39834, 14,872 lb. milk; 596 lb. fat. Owned by Harmon McPherson, Orkney, Ont.

Three-year-old:

“Scotch Thistle” 41685, 14,907 lb. milk; 631 lb. fat. Owned by A. S. Turner & Son, Ryckman’s Corners, Ont.

Two-year-old:

“Springbank White Rose,” 44100, 12,209 lb. milk; 546 lb. fat. Owned by A. S. Turner & Son, Ryckman’s Corners, Ont.

FRENCH-CANADIAN

Mature:

“Florida” 1353, 9,872 lb. milk; 514 lb. fat. Owned by D’Arcy Scott, Ottawa, Ont.

Four-year-old:
"Pauline 3rd" 2482, 10,210 lb. milk; 484 lb. fat. Owned by Paul Sylvestre, St. Simon Bagot, Que.

Three-year-old:
"Labelle 2nd" 2865, 7,916 lb. milk; 406 lb. fat. Owned by Director, Experimental Farms, Ottawa.

Two-year-old:
"Bruna Reine" 3228, 7,484 lb. milk; 337 lb. fat. Owned by Paul Sylvestre, St. Simon Bagot, Que.

GUERNSEY

Mature:
"Trislette of Whitewater" 392, 15,502 lb. milk; 631 lb. fat. Owned by Chas. Hawthorne, Chilliwack, B.C.

Four-year-old:
"Western Queen" 834, 12,132 lb. milk; 661 lb. fat. Owned by Banford Bros., Chilliwack, B.C.

Three-year-old:
"Western Queen" 834, 10,153 lb. milk; 576 lb. fat. Owned by Banford Bros., Chilliwack, B.C.

Two-year-old:
"Gladys of Willow" 654, 10,234 lb. milk; 544 lb. fat. Owned by W. M. Banford, Chilliwack, B.C.

HOLSTEIN-FRIESIAN

Mature:
"Toitilla of Riverside" 12256, 24,094 lb. milk; 846 lb. fat. Owned by Joseph O'Reilly, Peterboro, Ont.

Four-year-old:
"Hill-Crest Pontiac Vale" 18781, 22,785 lb. milk; 789 lb. fat. Owned by G. A. Brethen, Norwood, Ont.

Three-year-old:
"Plus Pontiac Artis" 16792, 21,018 lb. milk; 792 lb. fat. Owned by S. Lemon, Lynden, Ont.

Two-year-old:
"Morningside Bessie Echo" 27589, 16,031 lb. milk; 590 lb. fat. Owned by Wm. J. Aikins, Belleview, Ont.

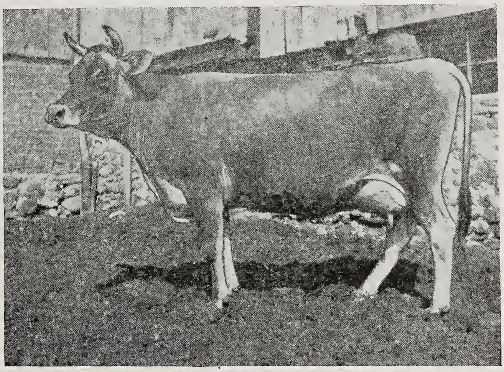
JERSEY

Mature:
"Sunbeam of Edgeley" 629, 18,744 lb. milk; 926 lb. fat. Owned by James Bagg & Sons, Edgeley, Ont.

Four-year-old:
"Beauty Maid" 2019, 14,852 lb. milk; 872 lb. fat. Owned by D. A. Boyle, Woodstock, Ont.

Three-year-old:
"Flora of Glenboyle" 3843, 11,954 lb. milk; 634 lb. fat. Owned by D. A. Boyle, Woodstock, Ont.

Two-year-old:
"Lady Pauline" 4266, 10,023 lb. milk; 491 lb. fat. Owned by Wesley McIntyre, Sardis, B.C.



JERSEY COW "BEAUTY MAID" 2019

SHORTHORN

Mature:
"Coquette 2nd" 107052, 17,723 lb. milk; 636 lb. fat. Owned by Edward Knight, Vanessa, Ont.

Four-year-old:
"Iford Waterloo Baroness" 104584, 10,410 lb. milk; 381 lb. fat. Owned by Ontario Agricultural College, Guelph, Ont.

"Norma of Northlynd" 101096, 9,080 lb. milk; 381 lb. fat. Owned by Geo. Jackson & Son, Downsview, Ont.

Three-year-old:
"Barbara" 96741, 11,208 lb. milk; 437 lb. fat. Owned by W. B. Affleck, Middleville, Ont.

Two-year-old:
"Jean Lassie 10483, 8,939 lb. milk; 371 lb. fat. Owned by S. A. Moore, Caledonia, Ont.

THE SEED BRANCH

SCREENINGS IN MILL FEEDS

J. R. DYMOND, SEED ANALYST

At the annual meeting of the Ontario Swine Breeders' Association held in Toronto, February 6th, 1917, the following resolution was adopted:

> "That whereas in purchasing mill feeds farmers have found the material offered for sale is heavily adulterated with injurious weed seeds, mill sweepings, etc., and in many cases the use of such has resulted in serious injury to, and loss of, valuable animals, we strongly urge the Government to investigate the situation and take immediate action to prevent the sale of such adulterated feed."

It is the practice of practically all flour mills in this country and in the United States to mix with the bran and shorts the screenings taken from the wheat. Formerly the material was unground but at the present time regulations in both countries require the complete pulverization of all weed seeds included in the feeds.

In Ontario the flour is made from (a) Ontario wheat, or, (b) Western wheat, or (c) a mixture. Feeders prefer the bran and shorts from the mills grinding Ontario fall wheat because it appears to be not only better in itself but is comparatively free from screenings. This in turn is due to the fact that the Ontario fall wheat is much freer from impurities than the western grain.

Western wheat is handled on the basis of its grade. On arrival at the terminal elevators at Fort William and Port Arthur it is cleaned to remove the smaller impurities and binned along with other grain of the same grade. This means that when an Eastern miller buys, say, No. 2 Northern wheat, the grain he receives is a composite of several lots, probably from different parts of the West. It thus follows that large shipments of wheat of the same grade are practically identical in weed seed content.

Before wheat is ground for flour all dirt and impurities are removed from it. The screenings consist chiefly of broken and shrunken wheat, wild buckwheat, cultivated and wild oats, and smaller quantities of the larger weed seeds, such as ball mustard and great ragweed and a trace of the small weed seeds which have not been entirely removed in former cleanings. The latter include lamb's quarters, wild mustard, hare's-ear mustard, stinkweed and various others of the western weeds.

It is these smaller weed seeds which are disagreeable in taste and which sometimes render the feed in which they occur unpalatable to stock, particularly hogs. However, the average run of screenings from Western wheat does not contain enough of these small seeds to affect the palatability of the feed with which it is mixed. It is only when they become concentrated in comparatively large numbers which might happen from a variety of causes that the trouble complained of in the above resolution could occur. The great bulk of screenings are the best of feed and if the smaller seeds could be entirely eliminated probably no objection to the inclusion of screenings in mill feeds would occur.

Millers are advised to regulate their cleaning machinery so that whatever small black seeds are contained in the wheat may be delivered separately and destroyed. Mills operated by steam can use these black seeds as fuel, as they burn readily on account of the high oil content of the mustards.

Shorts is a favourite feed for young pigs and any impurities that interfere with its value as feed are liable to cause serious injury to the health of the young animals. The present practice of mixing screenings with the mill feeds, which, in most cases cannot be objected to on the grounds of lowering the feeding value, makes it impossible ever to be certain when purchasing a lot of this feed that it does not contain deleterious impurities. Under present conditions it would be difficult for mills to dispose of their screenings were they prohibited from mixing them with their feeds. Most farmers and feeders have a great dread of screenings and would not buy this material if they knew what it was. In this they are mistaken. Screenings taken by eastern flour mills out of Western wheat is made up largely of broken and shrunken wheat and wild buckwheat. Only small quantities of other weed seeds including bitter mustard seeds and other objectionable impurities are found in this class of screenings. This material makes excellent feed for some classes of stock, and once feeders learn its proper uses it is probable that it will command a higher price than it now does when mixed with the feed. It should be especially valuable for sheep and poultry. Pigs will do well on it unless it contains mustards or other objectionable seeds. It makes a satisfactory cattle feed too. To prevent any possibility of spreading weeds, screenings should be ground or chopped before being fed. This may not be necessary when fed to poultry.

Always clean screenings so as to remove all seeds as large as lamb's quarters before trying to use them as feed. This is necessary, (1) to remove bitter seeds, (2) to prevent the spread of weeds (these small seeds are not pulverized by ordinary choppers). A number of feeders interested in this question could co-operate with a local miller in using grain screenings as suggested above, and demonstrate to themselves and the miller that it is feasible to keep the feed pure and dispose of the screenings separately as a feed for sheep, poultry, cattle or pigs.

Until a demand is created for the siftings removed from wheat in flour mills, and until their proper use is understood by feeders it is useless to press for their exclusion from the mill feeds, as this would only necessitate the throwing away of an enormous amount of good feed or its use as an adulterant of some other class of grain products.

DOMINION DEPARTMENT OF AGRICULTURE HONOUR ROLL

FURTHER LIST OF THE EMPLOYEES OF THE DEPARTMENT OF AGRICULTURE WHO HAVE ENLISTED FOR OVERSEAS SERVICE

A. Finnamore, Fredericton, N.B.
E. N. Castonguay, Ottawa.

CASUALTIES

R. H. L. Uglow, Ottawa (died of wounds).

PART II

Provincial Departments of Agriculture

DISTRIBUTION OF EGGS TO THE SCHOOL PUPILS

The poultry stock of several of the provinces has undoubtedly been greatly improved through the distribution of eggs for hatching. In order that the methods and experiences of the different provinces that have adopted this system may be available to each other, and more especially to those that have not undertaken this method of poultry improvement, the following articles have been brought together.

QUEBEC

BY BR. M. LIGOURI, OF THE PROVINCIAL POULTRY BRANCH

SOME twenty-five thousand eggs were distributed this year by the Poultry Branch of the Quebec Department of Agriculture to the pupils of elementary schools and others. Practically the eggs only of American breeds were included in this distribution: Rhode Island Reds, Plymouth Rock and Wyandotte. Most of the eggs were supplied by the poultry stations of the Department, by the co-operative associations, and Macdonald College.

The distribution was made through the District Representatives and under their direct supervision, with the help of women's institutes and some agricultural co-operative associations.

Each pupil receiving twelve eggs for hatching purposes must sign a contract by which he agrees to follow the instructions given concerning the care of the eggs, the hatching, raising, etc., and to report the results of his work to the Department on special forms supplied by the latter.

In the fall, all these young poultrymen are invited to take part in a local school fair and to show the chickens hatched from the eggs of the school distribution. This is the reason why the Department has made it a rule that no distribution can be made except in the districts where the school commissions have agreed to help in the organization of school gardens and of local or district fairs, where the produce of these gardens and of small poultry yards, cared for by pupils of rural or village schools, are shown

The judging at these school fairs is generally done by officers of the poultry and horticultural branches and prizes are given for the best exhibits.

MACDONALD COLLEGE

BY M. A. JULL, B.S.A., MANAGER, POULTRY DEPARTMENT

1. THE GENERAL POLICY OF DISTRIBUTION FOLLOWED THIS YEAR

FROM the time of the establishment of the Poultry Department at Macdonald College eggs have been distributed annually. This year, as in the preceding four years, eggs for hatching have been distributed under two plans:

First.—There has been the general distribution of hatching eggs to farmers and poultry breeders in different parts of the country. This is a commercial phase of the work carried on at the college. It involves the selling of eggs from well-bred strains to parties who purchase the same at normal price, and by this means eggs have been distributed over all parts of Quebec, many have been sent to various parts of the Maritime Provinces, a few have been sent to different parts of Ontario, particularly Eastern Ontario, a few have been sent to Western provinces, and a few have been shipped to various places in the United States. Chief attention, however, is given to the distribution of hatching eggs in the province of Quebec, and while it is a policy of the college to satisfy the needs of customers as far as possible, certain restrictions have been introduced to enable us to make as wide a distribution as possible. In previous years each customer was supplied with whatever quantity of eggs he desired. It was found, however, that through large orders being placed by certain individuals, it became practically impossible to supply the far larger number of customers who requested from one to four sittings each. Therefore, this year the policy was adopted of restricting the number of the eggs sent to each customer to four sittings. The introduction of this rule has allowed us to supply a far larger number of customers than in previous years.

The second plan of distributing hatching eggs is a continuation of a practice evolved in the spring of 1913. In that year the plan was adopted of distributing gratis hatching eggs to deserving rural school pupils, the first distribution being made at Cookshire, Lennoxville and Shawville. This year under the same plan eggs have been distributed to 329 schools, allowing only two sittings per school, the distribution being made at Shawville, Breckenridge, Lachute, Huntingdon, Cowansville, Clarenceville, Foster, Knowlton, Richmond, Lennoxville, Cookshire and Scotstown. In addition, eggs have been sent to various French-speaking districts of the province through the Provincial Department of Agriculture. As far as the applicants in the 329 schools of the English-speaking parts of the province are concerned, each applicant who received a sitting of eggs agreed to give the chickens hatched the best of attention and to show all those chickens, but no others, at a school fair to be held in the fall and where prizes will be provided.

2. THE SOURCES OF EGG SUPPLIES

The source of all eggs sold on a commercial basis to farmers and poultry breeders is the poultry plant of Macdonald College.

The sources of egg supplies for the distribution to school children include the poultry plant of the College and the flocks of a number of poultry house demonstrators, where the flocks have been kept under certain rules and regulations adopted by the Poultry Department of the college and where the breeding work is carried on under the supervision of the poultry department, the male birds being purchased each year from the college.

3. THE NUMBER OF EGGS DISTRIBUTED BY BREEDS

The following table gives the number of eggs distributed by breeds, each year for 1915, 1916 and 1917:—

BREED	1915	1916	1917	Total
Barred Plymouth Rocks	12,770	8,758	12,432	33,960
White Wyandottes	460	205	135	800
Rhode Island Reds (single comb)	135	390	120	645
White Leghorns (single comb)	540	695	1,060	2,295
Total	13,905	10,048	13,747	37,700

Although some nine different breeds are maintained on the college poultry plant it has not been the practice to offer hatching eggs from certain breeds, the numbers of which have been necessarily limited. Therefore, eggs for hatching have been offered from breeding pens only of Barred Plymouth Rocks, White Wyandottes, Single Comb Rhode Island Reds and Single Comb White Leghorns. Furthermore, it might be said that although we receive more inquiries for Barred Plymouth Rock hatching eggs than all other breeds put together, there are two reasons why the number of eggs of this breed are so large in contrast with other breeds. In the first place, because of the large demand Barred Plymouth Rocks are kept in larger numbers than any other breed and thus we are able to offer more hatching eggs than from the smaller pens of the other breeds. In the second place, the policy has been adopted of distributing eggs of one breed only to the school children, and the breed used up to the present time has been the Barred Plymouth Rocks.

The following numbers of eggs have been distributed to school children in the years 1915, 1916 and 1917 respectively, 7,930, 6,933 and 9,312.

4.—Relative to the inquiry regarding the distribution of day-old chicks we wish to say that Macdonald College has not followed the practice of selling day-old chicks, the chief reason being the impossibility of supplying the heavy demands over and above the large orders for eggs for hatching.

ONTARIO

BY R. S. DUNCAN, B.S.A., DISTRICT REPRESENTATIVE SUPERVISOR

DURING the past few years eggs of a bred-to-lay strain of utility breeds of poultry—Barred Plymouth Rock, Rhode Island Red and White Wyandotte—have been distributed pretty much over the province through the medium of the District Representatives in the rural school fair movement.

The general policy of distribution has been confined almost entirely to pupils attending the rural schools. In districts where a rural school fair has been organized three settings of eggs were allowed each single-roomed school. A two-roomed school was treated as two separate units for school fair purposes.

A nominal charge of 25c. per setting was made, the money thus collected being placed to the credit of the rural school fair association to be used as prize money. All other pupils had the privilege of taking a package of seeds of some crop for a home garden plot. In addition to their crop these pupils had the opportunity of taking a setting of eggs at the cost price of 60c. Thus in a school fair district composed of ten schools there would be 30 dozen settings distributed at 25c. per setting and perhaps from 1 to 3 additional settings per school at the cost price of 60c. each. Let us say for illustration that 40 dozen were distributed to the pupils in this district. If 60 per cent of these eggs hatched and the chickens attained maturity there would be 288 chickens alive at school fair time in September. We are quite safe in saying for every pullet hatched there is also a cockerel reared, which would result in an average of 144 pullets in the one school fair district of ten schools. Assuming that the above method of calculation is fair we would have approximately 33,448 pullets of the special bred-to-lay strain from the 9,283 dozen eggs distributed to the pupils of the rural schools in Ontario, each doing her bit to assist in the campaign of "Greater Egg Production for 1918". These bred-to-lay chickens have a great influence in the improvement of the poultry industry in the province. In addition a great interest is aroused amongst the pupils, and parents also, in poultry raising on the farms.

These eggs for hatching have in the past been obtained very largely through the Poultry Department of the Ontario Agricultural College, Guelph. During the past two or three years, however, the District Representatives have established poultry breeding stations in their respective counties and practically all the eggs distributed in 1917 were from this source. The District Representative usually arranges for a breeding station sometime in the fall by selecting some young farmer who is particularly interested in poultry and who will give special care to the poultry flock. The pullets are specially selected by the District Representative, who arranges to procure cockerels from a bred-to-lay strain from the O.A.C., Guelph, with which to mate up the hens. The breeding station consists of from 25-100 pullets and hens mated with from 2-7 cockerels.

Besides distributing eggs to school pupils the breeding stations are usually taxed to their utmost capacity to supply eggs for hatching to the farmers in the district.

The number of eggs distributed by breeds during the past three years may be summarized as follows:

	1915	1916	1917
Barred Plymouth Rocks	not classified according to breeds	7,357	8,940
Rhode Island Reds		406	293
White Wyandottes		295	50
Totals	6,868 doz.	8,058 doz	9,283 doz.

BY J. B. DANDENO, INSPECTOR OF ELEMENTARY AGRICULTURAL CLASSES

BY an arrangement with the Poultry Department of the O.A.C., Guelph, eggs for hatching were supplied in limited quantities for May delivery at 50 cents a dozen in 100-egg lots to pupils of schools in which classes in agriculture are maintained. The eggs were from an improved Barred Rock bred-to-lay strain, and the introduction of this breed into the rural districts is expected to prove of lasting benefit to the whole country.

It was suggested that part of the cost (say one-half) be borne by the school board and part by the pupils, thus placing the cost to the pupil at so reasonable a figure that the project would be within reach of all. The part of the expense borne by the school board may be charged to the agricultural account (P. S. Regulations 1915, 16 (1), page 85), as the hatching and rearing of the brood is a legitimate and useful home project for a pupil of the third, fourth or fifth forms.

High Schools:—Eight secondary schools received eggs for home project work in connection with the classes and these eggs were incubated in the school buildings under the direction of the teachers. In all there were 2,576 eggs distributed.

Public and Separate Schools:—Pupils in these schools securing eggs by this arrangement are expected to manage the incubation by the natural method at home, and attend to the rearing of the chicks. The results of these projects will be dealt with in the various schools concerned in the fall term. In this work 152 schools participated and 30,940 eggs were distributed to these schools.

MANITOBA

BY S. T. NEWTON, B.S.A., SUPERINTENDENT OF EXTENSION SERVICE

DURING the past season eggs for hatching purposes were supplied only to the new boys' and girls' clubs. However, a considerable number of the old clubs supplied new club members with eggs which they secured and paid for through our exchange service. Altogether 4,000 eggs were supplied in this way, in addition a large number of club secretaries were put in touch with responsible poultry raisers and bought their eggs direct. The number of eggs required for the new clubs was 1,530 dozens.

Naturally, when eggs are purchased in one part of the province and re-shipped to another, considerable loss is entailed through breakages, and occasionally through chilling, when the temperature happens to drop while the eggs are in transit, and to the casual observer it would seem that the egg phase of boys' and girls' club work is not a satisfactory one.

However, the fact remains that pure-bred poultry is now found on thousands of Manitoba farms, and a deep interest taken in the poultry, where four years ago a nondescript variety was kept and they were just known as hens, and, while the number of chickens secured per hundred eggs bought will average only 45, yet the number has been sufficient for the nucleus of large numbers of very respectable flocks.

During successive years it is felt that it will not be necessary to supply any eggs free to club members as pure-bred poultry can be found in every neighbourhood.

ALBERTA

BY A. W. FOLEY, POULTRY SUPERINTENDENT

THE Alberta Provincial poultry plant which is located on the university grounds, South Edmonton, was established eight years ago in order to encourage the production of more and better poultry. At that time the homesteaders and new settlers were desirous of increasing and improving their flocks, but found that, owing to the lack of good breeding stock, this was extremely difficult. Accordingly, the plant was established to meet this requirement and at the same time to be a practical demonstration in the matter of suitable housing, and in the care and management of poultry generally. The breeds selected for the work were Barred Rocks, Buff Orpingtons, White Wyandottes and Rhode Island Reds, as these breeds were in greatest demand. A pen of White Leghorns has also been kept as a representative of the non-weight varieties, although the demand for the stock and eggs of this variety has been very limited compared with that of other breeds.

THE POLICY FOLLOWED

In the early days of the plant, the distribution of eggs and male birds was the chief feature. Very few pullets have at any time been sold. It has been the policy, however, to sell females each year at the close of the breeding season to make room for the young stock the following winter. These females were sold at $1 each and rendered good service as breeding stock the following season. At this time, and in fact until recently, male birds were also sold at $1 each and eggs for hatching at $3.50 for 50 eggs and $6 for 100. This price was so low that most of the orders called for 100 eggs and were used to fill incubators. As the object of the work was to assist poultry men in securing foundation stock, it was found necessary to reduce the limit to 50 eggs per person. For several years following, eggs were sold at $1 per setting of 13 eggs, three sittings for $2.50 and $3 for 50 eggs.

Owing to the ever-increasing demand for hatching eggs, it was considered advisable to still further reduce the limit of eggs supplied and in 1917 the limit was three sittings, the price of eggs remaining the same, namely $1 per sitting and three sittings for $2.50.

SHIPMENT OF CHICKS

Early in 1913, a 1,200 egg incubator was installed in the plant and the experiment was made of shipping day-old chicks. This proved a success and orders are received each season for many times the number that can be supplied. One shipment of fifty chicks was forwarded to the farthest shipping point in the province, with three express transfers, and the customer raised the entire fifty to maturity. Another fifty was shipped to Calgary and on August 28th a photo was received of 46 of the matured chicks. Only two chicks had died, and one of the pullets commenced laying on Aug. 28th. The advantages of this system of distribution are that the customer knows exactly what he will receive for his money, because, if proper arrangements are made for the chicks on arrival, there is not the amount of risk there is when eggs are shipped. Moreover, when sending out eggs, there are often a number broken and rough handling may reduce the hatchability of the eggs that remain. There is also no risk with a sitting hen or an incubator.

A SUPERABUNDANCE OF ORDERS

In 1913 there were 7,927 orders for young chicks. Accordingly the capacity of the incubator was increased the following spring from 1,200 to 3,600 eggs. The price charged for the chicks is $4 for 25, with a maximum limit of 25 to each customer.

As the plant's capacity is even yet somewhat limited, orders are received each season for thousands of eggs and day-old chicks that cannot be supplied. However, the poultry industry has made rapid advancement in the last few years and many breeders of pure-bred poultry may be found in all parts of the province. When the plant is unable to fill orders, applicants are referred to reliable breeders as near their home district as possible.

Owing to having supplied 2,254 eggs of various breeds to rural schools it was necessary to cancel most of the chick orders in 1916.

EGG AND DAY-OLD-CHICK SHIPMENTS

	Eggs	Chicks
1915		
Barred Rocks	1,616	510
White Wyandottes	655	250
Buff Orpingtons	534	115
Rhode Island Reds	630	290
White Leghorns	115	62
	3,550	1,227
1916		
Barred Rocks	2,114	136
White Wyandottes	1,440	....
Buff Orpingtons	853	....
Rhode Island Reds	768	....
White Leghorns	188	100
	5,363	236
1917		
Barred Rocks	1,469	430
White Wyandottes	676	425
Buff Orpingtons	962	249
White Leghorns	488	188
Rhode Island Reds	845	162
	4,440	1,454

AN AGRICULTURAL INSTRUCTION ACT APPOINTMENT

On the recommendation of the Minister of Agriculture, Honourable Martin Burrell, Mr. J. W. Mitchell, B.A., was appointed on June 30, 1917, to assist in carrying out the provisions of THE AGRICULTURAL INSTRUCTION ACT. Mr. Mitchell's duties are to inspect, examine and report upon the work. Mr. Mitchell is well qualified in scientific and practical agriculture. After graduating in science at Queen's University, he took a special course in Dairying at the Ontario Agricultural College, and later became an instructor. He subsequently became Superintendent of the Kingston Dairy School and afterwards Professor of Dairying at Manitoba Agricultural College and Commissioner of Dairying for the Province. Recently, Mr. Mitchell has been Superintendent of Live Stock and Dairying in New Brunswick.

PRINCE EDWARD ISLAND

RECENT AGRICULTURAL LEGISLATION

A couple of Acts relating to agriculture were passed at the session for 1917 of the Prince Edward Island Legislature. One of these, entitled "An Act for Promoting the Settlement of the Unused Lands and the Development of other Resources of the Province", has for its object the making of reasonable provision for the settlement of returned soldiers by organizing and preparing areas of land for the purpose. The Act gives the Lieutenant-Governor in Council power of expropriation when considered necessary For the purposes of the Act debentures to the extent of $20,000 may be issued to run for a period not in excess of twenty years.

The second agricultural measure passed is "An Act to Incorporate the Prince Edward Island Co-operative Egg and Poultry Association." The usual corporate rights are given with power to borrow and loan. The association is to have no share capital, but is to create a fund of not less than $15,000, nor more than $50,000, by means of notes from egg circles and membership fees. The directorate is to consist of ten members chosen from delegates from egg circles at the annual meeting. Egg circles must be approved by the executive of the association. A circle must have seven directors, including a president, vice-president and secretary treasurer. Act 4 Geo. V., Cap. 22, incorporating the Prince Edward Island Co-operative Egg and Poultry Association, and amendments thereto, are repealed.

APPROPRIATIONS FOR AGRICULTURE

The following appropriations for agricultural purposes in 1917 were passed:

Commissioner of Agriculture, part salary	$ 900
Travelling expenses	350
Professor of Agriculture, part salary	1,400
Travelling expenses	300
Departmental expenses and contingencies	1,200
Printing and stationery	1,000
Exhibitions and live stock judging	8,780
Farmers' Institutes and educational work	2,070
Encouragement of field crops, horticulture, dairying and poultry raising	3,000
Vital statistics	700
Total	$19,700

NEW BRUNSWICK

RECENT AGRICULTURAL LEGISLATION

At the session of the legislature of New Brunswick which closed on June 22nd, 1917, the amendments to the Act for the Protection of Sheep against Dogs was the most important, so far as the Department of Agriculture is concerned. Formerly, fifteen ratepayers in any parish who were householders could petition the municipal council not to enforce the Act levying a tax upon dogs. Later an amendment was passed, whereby fifteen ratepayers in any parish where a petition had been presented to prevent dog taxation could petition to have the original Act enforced. The result was that the Act was not enforced in any part of the province. The amendments passed at the recent session provide that upon the petition of twenty-five ratepayers, being householders in any county, the council must pass the necessary by-laws providing for the machinery to enforce the Act as upon the statute books. The tax upon dogs and spayed bitches is $1.00 and upon bitches $5.00 per annum. The enforcement is no longer a matter for the county councils to deal with as they might wish, but they are forced to act upon the presentation of a petition. The taxes collected are to constitute a fund from which damages will be paid at the end of every fiscal year amounting to two-thirds of the actual loss sustained by the sheep raiser. If this fund is not sufficiently large to meet all demands there, they are to be met pro rata. Every incorporated town or city within a municipality where the Act is enforced must pay to the municipality fifteen per cent of the amount collected as dog taxes within such town or city, and this sum becomes part of the fund to reimburse sheep raisers who have suffered from dogs.

HON. J. F. TWEEDDALE.
Minister of Agriculture for New Brunswick

An Act was also passed to facilitate the drainage of farm lands. When it is considered necessary to run a ditch or drain through adjacent property, the party desiring the same can apply to the municipal council for permission to carry out his project. On receipt of the application the council is to appoint a civil engineer or land surveyor to report upon the need for the ditch or drain and the damage that will be caused to the lands through which it may run. If the work cannot be carried out by mutual agreement the council may take such action as it deems expedient. If the person desiring the ditch or drain deposits sufficient funds to cover all costs the council can give permission to have the work done.

There was further an Act passed giving municipalities the power to raise twenty-five thousand dollars for the purchase of food or fuel to relieve the undue pressure upon the residents. The city of St. John is empowered to raise fifty thousand dollars for the same purpose. The measure is to be cited as "The Act relating to the High Cost of Living."

APPROPRIATIONS FOR AGRICULTURE, 1917

Civil Government	$ 6,058.35
Grants to Societies	18,000.00
Butter and Cheese Factories	500.00
Encouragement of Stock Raising and Encouragement of Dairying	6,500.00
Maritime Stock Breeders' Association	200.00
Encouragement of Poultry Raising	1,500.00
Encouragement of Horticulture	2,500.00
Standing Crop Competition and Seed Fairs	4,000.00
Provincial Dairy School	600.00
Brown Tail Moth Extermination	2,911.62
Lime Rock Crusher and Power	500.00
Bonus to Wheat Mills	2,000.00
Bonus to Mud Dredges for Fertilizers	500.00
Exhibitions	5,000.00
Farm Settlement Board	1,500.00
Greater Production	5,000.00
Seed, Purchase of	30,000.00
*Encouragement of Poultry-raising	500.00
*Bonus to Wheat Mills	1,000.00
Travelling Expenses, Contingencies, Miscellaneous and Insurance	5,250.00
Total	$94,019.97

*Supplementary estimates.

DISTRICT REPRESENTATIVES AND OTHER APPOINTMENTS

BY W. R. REEK, B.S.A., SECRETARY FOR AGRICULTURE

THE Department of Agriculture of New Brunswick has decided to adopt the District Representative or District Agent system of assistance to farmers. The divisions will not depend altogether upon the present county lines, but counties may be grouped or sections of counties may be grouped. It is very necessary that men be placed in districts in New Brunswick who are familiar with the particular forms of agriculture, and also in some sections it is necessary to engage men who are able to speak two languages, English and French. Three appointments have already been made:

J. H. King, B.S.A., to represent Westmoreland and Albert.

E. A. Taylor, B.S.A., to represent Queens and Sunbury.

Antoine C. Belliveau, to represent Kent county.

Mr. M. A. MacLeod, until June 1st editor of the *Maritime Farmer*, at Sussex, has been appointed Superintendent of Agricultural Societies for the province. Mr. MacLeod was connected with the *Maritime Farmer* for eleven years and is closely in touch with agricultural conditions throughout the province. He has been a very active worker in co-operative enterprizes for a number of years and the success attending some ventures are due to his initiative.

Mr. Thomas Hetherington, B.S.A., a graduate from Macdonald College, 1917, has been appointed Live Stock Instructor for the province. He was on the staff of the *Farm and Dairy* for a few months.

NOVA SCOTIA

AGRICULTURAL INSTRUCTION ACTIVITIES

BY J. G. ARCHIBALD, COLLEGE OF AGRICULTURE, TRURO

ENTOMOLOGICAL WORK

UNDER the direction of Prof. W. H. Brittain, Provincial Entomologist, the following work is being carried on:—

At Truro:—

(1) Investigation of the life history and control of the cabbage root maggot.

(2) Potato beetle and potato blight investigation. In this latter particular attention is being paid to the following points:

- (*a*) The effect of the carrier on the toxic value of the poison.
- (*b*) The effect of the poison on the fungicidal value of the carrier.
- (*c*) The fungicidal value, if any, of the various arsenical poisons.
- (*d*) The correct strength of the arsenical poisons for use with Bordeaux mixture and alone.

In the Annapolis Valley:—

(1) Comparative tests on the value of various combinations of spray materials and dust mixtures.

(2) Demonstrations are being held at a number of points on the control of the green apple bug.

(3) The detailed study of orchard aphids and methods of control which has been carried on for the past three years is being continued in the field laboratory at Kentville.

A number of miscellaneous insects are also being studied. Two bulletins have recently been published, one entitled "The Apple Maggot in Nova Scotia" and the other "The Green Apple Bug in Nova Scotia." A popular press bulletin on the spraying of potatoes has recently been issued and is being distributed among the farmers.

Apiary inspection work for the year has been carried on systematically and thoroughly by Mr. C. B. Gooderham, who has recently severed his connection with the Department and assumed the duties of assistant in the Division of Apiculture at Ottawa.

DEPARTMENT OF CHEMISTRY

(1) The systematic survey of Nova Scotian soils from the chemical standpoint is being prosecuted. Two of the more important agricultural districts, namely, the Stewiacke and Margaree Valleys, have recently been visited and representative samples have been taken from the various soil types in these districts. It is planned to overtake at least two other districts this year. Special attention is being paid to the question of soil acidity and where lime has been recently used an endeavour is being made to ascertain what benefit has accrued, if any.

(2) A study is being made of the various seaweeds growing along our coasts, both by actual chemical analysis and by box experiments.

DEPARTMENT OF HORTICULTURE

The principal activities of this department carried on under THE AGRICULTURAL INSTRUCTION ACT are confined to:—

(1) *Model orchards:*—These were established in various parts of the province several years ago. These orchards are planted by the Department and are under its supervision thereafter. The work in connection with these orchards is half paid for by the federal grant and half by provincial aid.

(2) *Demonstration orchards:*—These are bearing orchards of which the Department agrees to take charge for several years in order to demonstrate to the farmers just how a bearing orchard should be cared for.

(3) *Demonstration vegetable gardens:*—At several of the places where model or demonstration orchards are located, demonstration vegetable gardens have also been established. The object of these is to show the people what garden crops are most suited to their soil and climatic conditions and just how much valuable food may be obtained for household use from the home garden. Canning demonstrations will be held at several of these gardens in the autumn. These activities require the attention of two special assistants whose salaries are paid from the funds provided under THE AGRICULTURAL INSTRUCTION ACT.

Prof. M. Cumming, Secretary for Agriculture, has just returned from a trip to the upper provinces and the United States, during which he investigated the problem of light tractor ploughs for this province. As a result of his visit he has practically completed plans to have a number of tractors operated experimentally in Nova Scotia during the coming autumn.

ONTARIO

APICULTURE SUMMER COURSE, O. A. C., 1917

THE 1917 summer short course in apiculture held at the Ontario Agricultural College, Guelph, was a decided success. Ideal weather conditions prevailed during almost the entire week permitting day sessions to be held in the apiary as advertised in the programme, without change in the schedule. This gave the students time and opportunity for actual practice in the handling of bees. Owing to the extremely late spring and general shortage of help in the country the attendance was much smaller than was expected. In all 16 students were enrolled and took a keen interest in the work.

The day sessions were of a practical nature and were conducted by Morley Pettit, Provincial Apiarist, assisted by E. G. Carr, Deputy State Bee Inspector, New Egypt, N.J., and Jas. Armstrong, Vice-President Ontario Bee-keepers' Association, Rt. 1, Selkirk, Ont. The object of this course is to enable the students to put into practice the knowledge gained at the January course,—"To know by doing." Wintering, spring management, swarm control, bee disease, queen rearing, extracting and many other essential points were taken up and thoroughly explained and demonstrated.

In the evenings illustrated lectures were given and dealt with the broader phases of apiculture. These lectures were well attended not only by the students but by many outsiders who were interested in apiculture and who were unable to attend the day sessions. Mr. E. G. Carr gave an interesting talk on "Bee-keeping Conditions in North Carolina," and dealt with conditions as he found them in that state recently while making an apiculture survey for the United States Federal Government. Mr. Pettit's lecture on "The Development of the Bee-keeping Industry in Canada," was illustrated by views of bee-keepers and their apiaries in all the provinces. He pointed out the great possibility of the honey industry in Canada and showed how Canadian bee-keepers can help and are helping to produce a great quantity of food for the nation.

FARMERS' AUTOMOBILE TOUR

THE third annual automobile tour of the farmers of Dufferin county under the guidance of Mr. H. A. Dorrance, B.S.A., District Representative, took place on July 3, 4 and 5, the route being through the counties of Wellington, Middlesex and Oxford and a part of Perth and Waterloo. The party left Orangeville in five cars, the earliest stop being made at Guelph, where the Ontario Agricultural College and the Winter Fair Buildings, where wool-grading was in progress, were visited. At the College the experimental plots were inspected, a special feature pointed out being the excellent results that are apparently being obtained from the annual pasture mixture that the College is fostering, consisting of one bushel each of wheat, oats and barley and seven pounds of red clover seed per acre. Other items of special interest were some of the new strains of oats being developed and the method of growing mangel seed. From Guelph the tour led through Kitchener, Stratford and London, from which point several farms were visited. Passing Strathroy, the party took in the Muncey Institute, where Indian boys and girls are trained. Wellwood farm received attention and thence the route laid through Oxford county. The outstanding features of the district along which the tour laid were the generally good roads, the well-built and well-kept farm homes, and the large number of silos that were seen.

SHORT COURSES FOR LIVE STOCK AND FIELD CROP JUDGES

AFTER a lapse of one year the Ontario Department of Agriculture has resumed the short courses for judges supplied to agricultural societies for the fall fairs and field crop competitions. The courses were held at the Ontario Agricultural College, Guelph, on July 2nd, 3rd and 4th, and at the Central Experimental Farm, Ottawa, on July 9th, 10th and 11th. At Guelph there were 200 judges present from the counties west of York and Simcoe, inclusive, and Muskoka. At Ottawa 125 attended from east of York and Simcoe and from Northern Ontario.

The Department of Agriculture, through the Agricultural Societies Branch, of which Mr. J. Lockie Wilson is superintendent, supplies judges to 214 fairs held by agricultural societies, and to 177 agricultural societies holding field crop competitions. The field crop competitions are more extensive than usual this year, embodying 3,500 fields and including crops of wheat, oats, barley, corn, potatoes, clover, turnips, mangels, beans, and peas.

The short courses followed a regular programme. The judges were divided into classes for heavy horses, light horses, beef cattle, dairy cattle, sheep, swine, poultry, and field crops. For the live stock classes exhibits of animals of the respective classes were brought before the judges and placed in charge of an official of the Ontario or Dominion Departments of Agriculture. The animals were placed by the judges, and after a number of them had given oral reasons for their decisions the official in charge of the class gave his placing and his reasons therefor. In the field crop classes practically the same course was followed, but, in addition, score cards were used. The judges met at the experimental plots; each scored the crops according to his judgment, and after some discussion the official in charge gave out his placings with his reasons. As a result of these courses it is expected that all the judging through out the province will be carried on by trained men in a uniform manner.

LIVE STOCK JUDGING COMPETITIONS

BY C. F. BAILEY, B.S.A., ASSISTANT DEPUTY MINISTER OF AGRICULTURE

AS has been previously mentioned in THE AGRICULTURAL GAZETTE the Ontario Department of Agriculture through the District Representatives has been conducting courses in agriculture for farmers' sons during the winter months. The judging of live stock in addition to the judging of field crops and roots is one of the prominent features of this course and has undoubtedly done much to develop the young farmers throughout the province along these lines. Two years ago inter-county live stock judging competitions were inaugurated in connection with the Winter Fairs at Guelph and Ottawa. A great deal of interest has been taken in these two contests as may be shown by the fact that practically every county in the province having a District Representative was represented with a team each year.

This year the Canadian National Exhibition, Toronto, and the Central Canada Exhibition, Ottawa, are putting on for the first time a judging contest open to farmers' sons under 26 years of age who are not graduates of an agricultural college. The following are the rules and regulations and prizes offered in each of these contests:

CANADIAN NATIONAL EXHIBITION, TORONTO

Competitions will be held under the supervision of the Agricultural Department of the Ontario Government, open to farmers or farmers' sons under 26 years of age. Graduates of an agricultural college will not be eligible.

The judges for the competitions will be supplied by the Ontario Department of Agriculture.

Entries must be made on the regular entry forms and received by the manager of the exhibition, Dr. J. O. Orr, not later than Tuesday, August 14th.

Contestants will be allowed 25 minutes for placing and reasons.

Contestants will be permitted to enter in one class of live stock (including poultry) and either fruit and vegetables, or grain and roots.

Contestants will be notified of the days and hours that the judging will take place.

Prizes will be awarded on a basis of 100 points; placing, 50 points; reasons, 50 points.

PRIZES FOR LIVE STOCK:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$20	$19	$18	$17	$16	$15	$14	$13	$12	$11	$10	$9	$8	$7	$6	$5

PRIZES FOR POULTRY, GRAIN AND ROOTS, FRUIT AND VEGETABLES:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$15	$14	$13	$12	$11	$10	$9	$8	$7	$6	$5	$4	$3	$2	$1	50c

Class A—Heavy Horses.
" B—Beef Cattle.
" C—Dairy Cattle.
" D—Sheep.

Class E—Swine.
" F—Poultry.
" G—Grain and Roots.
" H—Fruit and Vegetables.

CENTRAL CANADA EXHIBITION, OTTAWA

In order to encourage a deeper interest in agriculture on the part of young men in Canada, the Central Canada Exhibition at Ottawa has inaugurated a special competition to be open to farmers' sons under 26 years of age. Graduates of an agricultural college will not be eligible. Each contestant will be permitted to enter in not more than two classes of live stock.

PRIZES ARE AS FOLLOWS

1	2	3	4	5	6	7	8	9
$15	$14	$13	$12	$11	$10	$9	$8	$7

Classes are, Heavy Horses; Beef Cattle; Dairy Cattle; Sheep; Swine.

The Ontario Department of Agriculture also conducts various competitions with farmers' sons who have taken the course in agriculture under the District Representatives such as acre profit, baby beef, feeding hogs for profit and dairy profit. The Central Canada Exhibition is anxious to encourage the bacon hog industry in Eastern Ontario and with a view to this end have arranged for a Junior Farmers' Inter-County Bacon Hog Contest. This contest, I believe, will create a great deal of interest and do much toward encouraging this very important industry. The following are the rules and regulations and prize list of the contest:

For pair bacon hogs fed and cared for by contestant—open to farmers' sons under 26 years of age. Counties will be grouped and prizes given in each group as follows:

1st $30; 2nd $25; 3rd $20; 4th $15; 5th $10

Group I.—Northumberland; Peterborough; Hastings; Prince Edward.

Group II.—Lennox & Addington; Frontenac; Leeds.

Group III.—Renfrew; Lanark; Carleton; Russell.

Group IV.—Grenville; Dundas; Stormont; Glengarry; Prescott.

SPECIALS FOR JUNIOR FARMERS INTER-COUNTY BACON HOGS

For best pair of bacon hogs exhibited in class open only to winners of Groups I, II, III, IV of class—.

1st $40; 2nd $30; 3rd $20; 4th $10.

IMPROVING THE POTATO INDUSTRY IN ONTARIO

BY R. S. DUNCAN, B.S.A., DISTRICT REPRESENTATIVE SUPERVISOR

AT a special meeting held in the office of the Department of Agriculture, Parliament Buildings, Toronto, on Thursday, July 19th, the question of "Improvement of the Potato Industry" was up for discussion.

Those present at the meeting were Dr. C. A. Zavitz, Experimentalist, O.A.C., Guelph; T. G. Raynor, Seed Branch, Ottawa; G. C. Cunningham, W. A. McCubbin and George Partridge of the Dominion Laboratory of Plant Pathology at Fredericton, N.B., St. Catharines and Ottawa, respectively; C. F. Bailey, Assistant Deputy Minister; F. C. Hart, Director Co-operation and Markets Branch; Justus Miller, Assistant Commissioner of Agriculture and R. S. Duncan, District Representative Supervisor. Prof. W. T. Macoun of the Central Experimental Farm and L. H. Newman, Secretary, Canadian Seed Growers' Association, were invited but were unavoidably absent.

The meeting was called primarily to discuss the potato industry as it effected Ontario. Briefly stated the discussion of the conference was confined largely to the following headings:

1. The establishment of seed potato plots for rural school fairs.
2. The control of potato diseases.
3. The selection of a potato farm in Northern Ontario for the development of further tests and strains with potatoes.
4. The working up of a profitable trade in potatoes by the potato growers in New Ontario Districts who will produce the seed and potato growers in Old Ontario who will produce the commercial crop.
5. The conduction of variety and strain tests of potatoes by District Representatives.
6. The conduction of demonstrations in spraying for control of late Blight.
7. The selection of the following varieties with the object of trying to standardize the potato industry and to secure a greater uniformity throughout the province:

   Early: Extra Early Eureka; Irish Cobbler.

   Late: Green Mountain: Empire State; Dooley.
8. The encouragement of the formation of seed centres operating under the rules of the Canadian Seed Growers' Association.

In reference to the establishment of seed potato plots by District Representatives in order to obtain pure seed, free from disease for distribution to the pupils in the rural school fair movement the following regulations were issued early in the spring through this office:

REGULATIONS GOVERNING SEED POTATO DEMONSTRATION PLOTS FOR PROCURING POTATOES FOR SCHOOL FAIRS

1. Choose the variety best adapted to the district which you wish to improve and perpetuate. (We want to avoid multiplicity of varieties.) Obtain from a reliable source from 4-6 bushels of pure, clean seed, true to name of the chosen variety.

Note:—If such tubers cannot be procured do not attempt to conduct this seed plot for 1917.

2. Select some farmer in your best potato-growing section, preferably on lightish soil, to conduct this seed plot, who will agree to give this plot special attention as to fertilizing and cultivation.

3. The District Representative should treat the tubers for scab according to the recognized practice.

4. The District Representative is to furnish material to spray the plot with Bordeaux mixture and is to assist in spraying the potatoes from 4 to 6 times, depending on weather conditions. This will make a good demonstration plot for the control of blight.

Accounts for spray material are to be charged to the County Grant where sufficient funds are still available.

5. A hill selection should be made at harvest time in order to select from 6-8 bushels of good tubers with which to continue the seed plot the following year. These tubers should be stored in a suitable place in a separate bin. The District Representative will be expected to assist the farmer in making this hill selection.

6. The District Representative should secure the option of purchasing what seed potatoes are required for school fair and other purposes at the prevailing market priec for seed potatoes March 1st of the following year. It is to be understood that the farmer will store potatoes until after danger of frost, when delivery may be made.

All told 30 District Representatives are operating seed potato plots with one or other of the approved varieties previously mentioned.

As to disease control, Messrs. Partridge and McCurry who are specialists in potato diseases from the Dominion Laboratory of Plant Pathology at Ottawa are now inspecting these school fair seed plots with the District Representatives with the object of roguing the plot for disease and staking a number of the most healthy plants with a view to hill selection of tubers at harvest time.

At the conclusion of this work these men will also inspect fields of potatoes in a given area in Western Ontario, Caradoc township in Middlesex county, and in Eastern Ontario, Carleton county.

SUMMER PRUNING THE YOUNG APPLE ORCHARD

BY E. F. PALMER, B.S.A., DIRECTOR, HORTICULTURAL EXPERIMENT STATION

At the Horticultural Experiment Station, Vineland, Ontario, an experiment in the pruning of young apple trees has been under way since 1914. The following is a brief description of the experiment and a statement of the results obtained to date:

The apple orchard at the experiment station, in which the pruning work is being conducted, consists of 646 trees, including 170 trees of standard varieties: Hyslop, Spy, Greening, Baldwin, King, Hubbardston, Cranberry, Jonathan and McIntosh, and 476 trees of fillers, Dudley, Duchess, Wagener, Wealthy and Ontario. The orchard was planted in the spring of 1911 and the pruning experiment started in the spring of 1914. Three systems of pruning are being followed—winter pruning, summer pruning, and little or no pruning.

Winter Pruning:—These trees receive the usual treatment as practised in Ontario, being severely cut back and thinned out in March or April. The object is to form a framework that is pleasing to the eye, and at the same time will carry a maximum load of fruit without damage when the tree comes into bearing.

Summer Pruning:—The trees are well thinned out in August and cut back only enough to keep the trees within bounds, which usually involves simply pinching out the terminal buds from the higher branches. The object is as much as possible to admit a maximum of sunlight and air to develop as many fruit buds and fruit spurs as possible, but at the same time not to sacrifice the shape of the tree any more than is necessary. Early bearing is the object in view.

Little or No Pruning:—These trees receive no pruning whatever except that a few cross and broken or otherwise injured limbs are removed. They are left as much alone as is conveniently possible.

Careful records are made of the size and vigour of the trees, blossoming dates, number of fruit spurs and fruit set, quantity of fruit harvested, and comparative size, colour and keeping quality of the fruit.

TABLE I—SUMMARY OF FRUIT PRODUCED: 1916. PRUNING EXPERIMENT, SECTION 7

METHOD	Number of Trees	Total Weight of Fruits	Total Number of Fruits	Average Weight of Individual Fruits
Unpruned	207	3,260 lb.	14,416	.2261 lb.
Winter pruned	228	227 "	781	.2906 "
Summer pruned	209	1,820 "	7,169	.2538 "

As will be readily seen from a careful study of the above table, the results to date are very uniform throughout. The summer-pruned and unpruned trees were loaded with fine marketable fruit both in 1915 and 1916, while the winter-pruned trees, with the exception of two or three of the filler varieties, have borne practically no fruit. (In 1915, the winter-pruned trees bore no fruit, the summer-pruned trees 127.7 lb., and the unpruned trees 209.4 lb.). There appears to be no doubt that summer pruning will bring the young orchard into profitable bearing much quicker than the plan usually followed of heading back severely each year. The unpruned trees, of course, have given similar results, but due to this lack of pruning the trees are not in as good condition for future bearing. They are more straggly, and have too many branches, thus not allowing as free a circulation of air or as much sunlight as is desirable for the control of insect pests and diseases and the production of the best quality of fruit.

TABLE II—AVERAGE DIAMETER IN INCHES OF TRUNKS OF TWO STANDARD AND TWO FILLER VARIETIES

VARIETY	Unpruned	Winter Pruned	Summer Pruned
Wealthy	2.267	1.967	2.130
Duchess	2.093	1.703	1.942
Baldwin	2.369	2.062	2.337
Greening	2.489	2.052	2.393

The evidence presented in Table II is fully as marked as in the previous table, and is again strongly in favour of the unpruned and summer-pruned trees. It is of interest also to note that the difference between unpruned and summer-pruned is quite marked, in the case of the earlier-bearing smaller-growing varieties, Wealthy and Duchess, while in the case of the later-bearing, larger-growing varieties, Baldwin and Greening, it is comparatively small.

The differences in the average diameters of the trunks in the three systems of pruning is, of course, correlated with differences in the general size and vigour of the trees.

DISTRICT REPRESENTATIVES CONFERENCE

UNDER the direction of Mr. C. F. Bailey, B.S.A., Assistant Deputy Minister of Agriculture, the District Representatives of the Ontario Department of Agriculture met in conference at the Russell House, Ottawa, on July 10th, 11th, 12th and 13th. In addition to following a regular prepared programme, addresses were delivered by Mr. W. J. Black, Commissioner under THE AGRICULTURAL INSTRUCTION ACT; Dr. James W. Robertson of the Commission of Conservation; Mr. H. S. Arkell, Acting Live Stock Commissioner; Mr. F. H. Auld, Deputy Minister of Agriculture for Saskatchewan; Mr. S. T. Newton, Director Extension Service, Manitoba; Mr. F. N. Savoie, Secretary, Department of Agriculture, Quebec, and by District Representatives from the provinces of Saskatchewan and Quebec.

On July 10th and 11th the District Representatives visited the Central Experimental Farm where luncheon was served and brief addresses delivered by Mr. J. H. Grisdale, Director, Dominion Experimental Farms; Mr. W. J. Hanna, Food Controller for Canada; Mr. Wm. Smith, M.P.; and Mr. T. Wallace, M.P. After the luncheons, tours of the fields and experimental plots, barns and stables and other points of interest were made under the direction of Professor Grisdale, Mr. E. S. Archibald and other members of the Experimental Farm staff. During these tours the work and experiments being conducted were fully explained by the officials in charge.

The programme of the conference included discussions on the following subjects: How to make a special course in agriculture more effective; the work of the Junior Farmers' Improvement Associations for one year; Competitions—feeding hogs, dairy profit, baby beef, acre profit and poultry for profit. In connection with the subject of competitions, the discussion brought out many interesting features, making it necessary to appoint committees to deal with these competitions so that the greatest amount of success would be the outcome.

Farm Management, Surveys, and Book-keeping received treatment at the hands of Mr. L. H. Newman, Secretary, Canadian Seed Growers' Association, Mr. R. S. Duncan and Mr. J. E. McRostie. In the discussion of this subject it was made clear that any system adopted should suit the kind of farming being followed, simplicity being the keynote.

Mr. J. W. Stark, District Representative for Peel County, and Mr. Justus Miller, Assistant Commissioner of Agriculture for Ontario, outlined and described the rural survey being made of Caledon township in Peel county, the purpose of which is to secure definite information with regard to rural conditions so that the rural problem may be successfully combated and the township made into a model township. Prof. R. Harcourt, Professor of

Chemistry at the Ontario Agricultural College, outlined the soil surveys which, under his supervision, are being made throughout the province of Ontario.

The second day of the conference was set apart for the discussion of co-operative organizations. The discussion on this subject, led by Mr. W. P. Macdonald, District Representative for Lambton county, demonstrated the progress co-operation has made throughout Ontario, which is due in a large measure, to the successful efforts of the District Representatives. Mr. Macdonald in his remarks outlined the principles and objects governing the Lambton County Co-operative Association which has for its object the buying and selling co-operatively of all farm produce. This association, as pointed out by Mr. Macdonald, is managed by one man, a method which, the speaker claimed, is one of the chief essentials to success. Lambton county also has fifty-two farmers' clubs, the majority of which meet at least once every two weeks throughout the year.

Mr. W. H. Smith, B.S.A., outlined the co-operative work being conducted in Leeds county. Mr. F. C. Hart, Director of Co-operative Organizations, Toronto, and Mr. R. W. Wade, Director Live Stock Branch, Toronto, took a prominent part in the discussion on co-operation, the latter dealing particularly with the co-operative handling and selling of wool by the Ontario Sheep Breeders' Association, which had this year been attempted for the first time.

Hydro Electric Power on the farm was discussed by Messrs. J. W. Purcell, H. C. Duff and G. R. Green.

The improvement of the potato industry was discussed by Mr. T. G. Raynor of the Seed Branch, Ottawa, Dr. C. A. Zavitz, Ontario Agricultural College, Guelph, Mr. W. A. McCubbin, Mr. L. H. Newman and Mr. R. S. Duncan. As a result of this discussion, a special meeting was arranged to be held in Toronto on Thursday, July 19th, 1917, at which a definite policy for the province with regard to the potato industry was formulated.

Labour Bureaux and other work was discussed by Dr. W. A. Riddell, Messrs. R. A. Finn, R. Schuyler, and J. S. Knapp. This discussion brought to light many of the difficulties experienced by the District Representatives in their efforts to cope with the farm labour problem and that the boys who had made application for farm labour and been placed upon farms had given general satisfaction.

The third day of the conference was occupied in a discussion of school fairs. Organization and methods of conducting school fairs were freely discussed and much helpful information resulted. Different methods are followed in different counties for the organization of rural school fair boards. This work requires considerable time and makes necessary the holding of many meetings. To do this with a minimum expenditure of time, some of the District Representatives had followed the plan of calling together the presidents and secretaries of these boards and, in assembly, giving them full instruction relative to the holding of a meeting and the appointment of officers. From this meeting the presidents and secretaries were able to return to their own districts and do the necessary organization work for their district school fair. Another plan which had met with success, was the organization of school fair boards by correspondence.

Other subjects receiving attention were the Home Garden Contest, Systems of Collecting Information, and Ploughing Matches. With regard to the latter, Mr. Bailey announced that arrangements were under consideration whereby ploughing matches would be conducted by Junior Farmers' Improvement Associations in the various counties. At provincial ploughing matches, held in the province, there is a general lack of young men participants. To overcome this and to encourage the young men to take a greater interest in good ploughing, the scheme outlined by Mr. Bailey is being carefully considered.

The discussion on the subject of Farm Drainage was led by Mr. J. R. Spry of the Ontario Agricultural College, who dealt chiefly with the various laws relating to drainage and to the procuring of loans of money by farmers for this purpose. Farm Drainage formed the subject of a very free and able discussion, the result of which was a general recommendation that there should be available a number of well-trained drainage men, who could make surveys for farmers and adjust the many drainage problems and difficulties experienced by the District Representatives in their respective counties.

Under the subject of Variety Tests, the discussion brought out clearly that much good work was being accomplished, but that greater success and more influence resulted from work done on individual farms and for individual farmers, the same being true with regard to field and live stock feeding demonstrations. With regard to the latter, Mr. E. K. Hampson, District Representative for Welland county, and Mr. W. D. Jackson, District Representative for Carleton county, outlined and described work performed in their respective counties in the way of assisting farmers to compute balanced rations for special feeding purposes. Work of this nature was easily and quickly noticed by other farmers and much good followed. Mr. Jackson also outlined and gave details with regard to the Potato Growing and Vegetable Gardening competitions conducted in the counties of Carleton and Russell and stated that as a result of these competitions, the farmers of these counties are following more up-to-date practices in potato growing and increased yields are the result. Similarly, as a result of the vegetable gardening competition, the farm garden was now looked upon as an essential adjunct to the farm.

Mr. G. A. Putnam, Superintendent of Institutes, Toronto, dealt with the subject of Farmers' Clubs and County Boards of Agriculture, outlining plans under consideration for the present year. These included many demonstrations along agricultural lines as well as demonstrations in the home canning of vegetables and fruits.

In dealing with the subject of Farmers' Week, Mr. H. A. Dorrance, District Representative for Dufferin county, and the originator of the idea in Ontario, pointed out that in order to make a success of a Farmers' Week, speakers of well-known ability must be secured. Entertainment is also necessary, as is the co-operation of the business men of the town in which the meetings are to be held.

Mr. S. C. Johnston, B.S.A., who is in charge of the moving picture bureau recently instituted by the Ontario Government, outlined the plans and work being undertaken, making the announcement that films would be available by January 1st, 1918, for use at agricultural meetings and short courses. It is the intention of the Ontario Department of Agriculture to place in each District Representative office a moving picture machine which can be used in any part of the county, so that the films available may be used for instructional purposes at meetings and at the regular four to six weeks courses in agriculture.

Mr. R. Schuyler, District Representative for Brant county, in discussing the subject of "Mock Auction Sales" pointed out that in his experience, the greatest success in conducting these sales had resulted from having an expert stock man value one animal before the members of his short course class. This gave the boys a general idea of the valuation of live stock and more satisfactory work was then done.

Dealing with the subject of "County Grants," Mr. R. S. Duncan announced changes affecting the handling of this annual grant of $500.

On the last day of the conference a visit was made to the Agricultural School and Farm for Eastern Ontario at Kemptville, Ontario. The feature of this day was a tractor demonstration, during which the operations of ploughing, rolling, harrowing, hauling a hay wagon with hay loader attached and in operation, and that of hauling a manure spreader over the ploughed ground, were performed.

The outstanding feature of these annual conferences is the fact that the men engaged in the work hear and learn of each other's successes and efforts, difficulties experienced in different counties are made apparent, and, in many instances, solutions are found in the successful efforts followed in other counties.

MANITOBA

CROP REPORT FOR THE FIRST HALF OF THE YEAR

ACCORDING to the crop report issued by the Provincial Department of Agriculture covering the first six months of the year, the total area of the province under grain crops was 6,502,197 acres and the total area under all crops 6,813,690; an increase over 1916 in the first instance of 200,318 acres and in the second of 230,303 acres. The different figures for 1916 and 1917 are as follows:—

ACRES UNDER CROPS

	1916	1917	Increase
Grain	6,301,879	6,502,197	200,318
Potatoes	62,581	66,084	3,503
Roots*	18,561	16,582	......
Fodder crops	200,366	228,827	28,461

*In roots there is a decrease of 1,979 acres.

NUMBER OF LIVE STOCK

The number of live stock for five years is given as follows:—

YEAR	Horses	Cattle	Sheep	Pigs
1913	300,753	456,936	52,142	248,254
1914	325,207	498,040	75,100	325,416
1915	329,994	631,005	76,577	286,433
1916	341,496	665,686	89,475	261,774
1917	419,006	669,082	146,776	375,597

Foals, calves, lambs and young pigs are included in the 1917 totals.

It will be noticed that there are increases in 1917 over 1916, of horses, 77,510; of cattle 3,396; of sheep 57,301 and of pigs 113,823.

FARM HELP

The following gives the farm help and average wages paid per month this year:—

Males Employed During Winter	Average Wages Winter	Males Employed During Seeding	Average Wages Seeding	Females Hired Spring	Average Wage
8,689	$21.00	16,915	$45.40	4,919	$19.00

PLOUGHING MATCHES AND DEMONSTRATIONS

BY S. T. NEWTON, B.S.A., SUPERINTENDENT, EXTENSION SERVICE, DEPARTMENT OF AGRICULTURE

As a means of promoting sociability and the get-together idea, the ploughing match seems to be in a class by itself, and in the great revival of interest in better methods of agriculture, the ploughing match and the summer-fallow competition are playing a very important part.

So many agricultural societies took up this work for the first time that a series of ploughing demonstrations were planned and carried out by F. F. Parkinson, himself a winner at many matches in previous years. In the demonstrations careful attention was given to the different hitches, adjustments, etc., and the proper methods to follow in the strike-out, so that all weeds are cut and no ridge is left in evidence at the centre of the "land".

When the demonstration was over, such terms as "feering," "sole furrow in and out", etc., were like A B C to the 50 or 60 men who turned out, and the summer-fallows in each district where demonstrations were given bear testimony to the benefit of the instruction. Possibly the most notable discovery made was that owing to wrong adjustments and too much side draft many farmers were wasting from 15 to 30 per cent of their horse or gas power.

MR. J. SUTHERLAND, BERESFORD, PROVINCIAL CHAMPION WITH WALKING PLOUGH

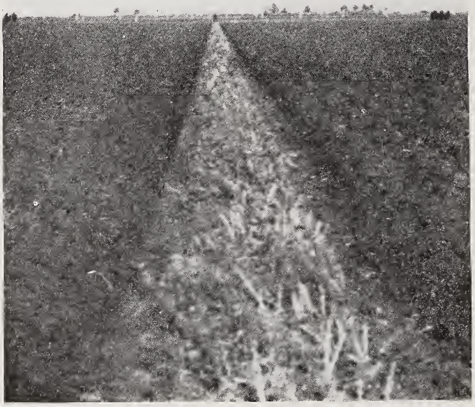
In Manitoba the two-furrow gang plough drawn by four horses is in general use. The horses are hitched in one of three ways, first, tandem; second, four abreast with the off horse in the furrow; and third, four abreast with the off horse on the ploughed land and the second horse in the furrow.

The demonstrations showed that there was the most side draft and consequent loss of power when the off horse was in the furrow, and that generally the best results were obtained when the teams were hitched tandem, and the chief reason that the latter method is not followed entirely is the difficulty of securing experienced help or men capable either of training the horses to work tandem or to keep them in training.

While the demonstration was in progress for the men, other demonstrations were provided for the ladies in either vegetable canning or home nursing, and the combined attendance ranged from 80 to 200.

In all, demonstrations were held at sixteen places in the province, and served to arouse interest and enthusiasm in the matches which followed within a fortnight.

This year 25 matches were held, and while the average number of competitors at each match was eight, yet the number who benefited was many times that number for the interest was maintained throughout, and every furrow turned was critically examined.



FINISH MADE BY MR. H. WISHART, WHO WAS AWARDED SPECIAL PRIZE FOR BEST FINISH IN THE GANG PLOUGH CLASSES

The ploughing match season each year culminates in the big provincial match at Portage la Prairie, when the winners from all the smaller matches meet to compete for provincial honours. This year the match was held on June 27th, and fully 3,000 people were present from all parts of the province, the great majority having motored in, and autos end to end and four abreast extended for over a mile in front of the farm where the match was being held.

MR. T. WISHART, PROVINCIAL CHAMPION WITH GANG PLOUGH

The winners at this match were Thomas Wishart of Portage la Prairie in the gang plough class, and J. Sutherland of Brandon in the class for walking ploughs.

On the following day the small gas tractor match took place, when there were ten competitors and another large crowd of interested spectators. J. A. Brownridge, the runner-up in the gang plough class with horses, was the winner.

The idea of having the farmers compete in a match of this kind and use their own ploughs was somewhat unique, and proved so successful that it will be continued next year.

Liberal support is given by the provincial Government to this work, the grant being 60 per cent of the amount actually paid out in cash prizes. Besides this, many medals, cups and other trophies are donated by private individuals who know that without good ploughing effective cultivation is not possible.

SUMMER-FALLOW COMPETITIONS

BY S. T. NEWTON, B.S.A., SUPERINTENDENT, EXTENSION SERVICE

AT the last session of the Manitoba Legislature provision was made in the Agricultural Societies Act for summer-fallow competitions, the idea being that the summerfallow competitions could be preceded by the ploughing match and followed by the standing crop competitions, and these again would give place to the seed grain fairs.

The Department of Agriculture gives a grant of 60 per cent of the amount actually paid out in cash prizes. Besides this, they supply an efficient judge or referee to cooperate with the two local judges in placing the awards.

The summer-fallows are inspected two or three times during the year. During the last inspection an automobile visit is made by all the people in the community to each of the summer-fallows in the competition. At this time, other methods of farming than the summer-fallow are observed, but, in general, most attention will be paid to the summer-fallows.

In the evening, lectures on cultivation will be given by members of the agricultural college staff.

This being the first year that this competition has formed a part of agricultural society work, only about 15 per cent of the societies are taking advantage of it, but over 60 per cent have expressed a desire to include this as one of their activities during the coming year.

A bulletin on summer-fallow was prepared early in the season. Following are the regulations governing the Virden Agricultural Society competition which gives a good idea of the plan usually followed:—

VIRDEN SOCIETY COMPETITION

To encourage and promote well cared for summer-fallow, the Virden Agricultural Society have decided to put on a contest known as "The Summer-Fallow Competition."

One hundred and forty dollars ($140.00) will be divided in the following prizes:

For the best summer-fallow: 1st, $50; 2nd, $35; 3rd, $25; 4th, $15; 5th, $10; 6th, $5.

The following rules will govern the competition, viz.:

1. Competitor must be a member of the Virden Agricultural Society.
2. Entire summer-fallow will be judged on the farm the competitor is living on.
3. No farm will be allowed to compete, with less than ten acres in summer-fallow.
4. Every competitor must give a statement of his method of ploughing and cultivation. The first three prize-winners' statements will be published.
5. Summer-fallow will be inspected three times; first, about July 10th; second, August 10th; third, October 10th.
6. Ploughing to be completed by July 15th unless the competitor is reploughing his summer-fallow.

Open to any farmer within a radius of twenty miles of Virden.

Entries to be in by Saturday, July 7th.

SASKATCHEWAN

JUNIOR AGRICULTURAL SERVICE LEAGUE

WITH the object of further encouraging the children of the province to save the wheat, the Junior Agricultural Service League of Saskatchewan is being organized. The assistance of the children this year in connection with the killing of thousands of gophers has done a great deal towards protecting the grain, and for this year the work of the new organization will be concentrated on the destruction of the gopher. It is expected that next year something may be done to assist in the control of weeds.

The Weeds and Seed Branch of the Department of Agriculture has announced that for service rendered the following system of promotion is planned; membership class, over 50 points; third rank, over 200 points; second rank, over 500 points; first rank, over 1,000 points; district bronze medal; provincial silver medal.

The regulations are as follows:

1. Two points are allowed for gophers destroyed up to and including Gopher Day, May 1, and one point after May 1.

2. Children 18 years old and under are eligible to become members of the Junior Agricultural Service League.

3. In order to become members, boys and girls must present gopher tails to the school teacher, who will report to the Department of Agriculture on the blank form supplied. Certificates will be issued by the Department giving the rank of each child. Buttons may also be issued later for each class and rank.

4. Teachers shall accept gopher tails only as evidence that gophers are destroyed. As soon as the gopher tails are counted by the teachers they must be destroyed. If the municipality pays a bounty the tails may be kept and sent direct to the municipal office.

5. The province will remain divided into the same thirty-six divisions as were arranged for the gopher competition in the spring. Division thirty-seven will be included in thirty-six.

6. A bronze medal will be awarded to the boy or girl getting the most points for the whole year in each division. A silver medal will be given to the boy or girl with the most points in the whole province.

7. No child who has been awarded a medal in the gopher competition will be eligible for another medal this year.

8. The children of the 980 schools that reported on May 1 in connection with the competition will be allowed two points for each gopher destroyed, and all those who destroyed more than 25 will be considered members of the Junior Agricultural Service League, and their standing will be sent to them as soon as possible.

When a child has destroyed sufficient gophers to warrant transference to another class, the teacher will report on a blank form which will be sent to all schools entering.

The various municipalities are taking a keen interest in any organization having as its object the destruction of the gopher, and it is confidently expected that the Junior Agricultural Service League will soon become a powerful factor in the war declared by municipalities and the provincial Department of Agriculture on the gopher.

PART III
Rural Science

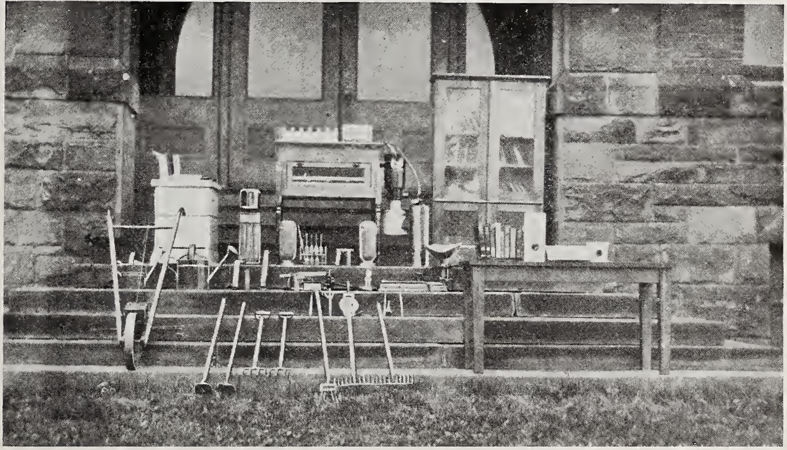
AGRICULTURAL EQUIPMENT IN PUBLIC SCHOOLS

PRINCE EDWARD ISLAND

BY J. E. McLARTY, B.S.A., RURAL SCIENCE DEPARTMENT

THE need for the practical in education is being felt by all connected with educational institutions. The training of the head, the hand, the heart, and the body is necessary to develop that type of citizen which our country demands.

The advent of agricultural education as a part of our public school course calls for much of the practical work and, as such, demands considerable equipment.



AGRICULTURAL EQUIPMENT IN ONE OF THE SCHOOLS OF PRINCE EDWARD ISLAND

To properly carry out this practical work the following equipment is necessary:—scales, measuring tape, standard measures (pint, quart and peck); seed testers; samples of grains, plants and weed seeds; small collection of native insects; alcohol lamp, test tubes and a few re-agents; milk-testing apparatus, thermometers, and lactometers; egg-candling boxes (supplied by Dominion Department of Agriculture); soil tubes and sampling auger; gardening tools, such as digging forks, hoes, rakes, spade, wheelbarrow, lawn mower, sprayer and pruning tools. The library should contain suitable agricultural reference books together with some leading periodicals and departmental bulletins and reports.

So far as equipment has been supplied for agricultural instruction in the schools of this province the funds have been taken from the annual grant to the province under THE AGRICULTURAL INSTRUCTION ACT. The equipment has been selected principally by the teacher in charge upon the recommendation of the Department of Education. Suitable cupboards are provided for their care.

NEW BRUNSWICK

BY R. P. STEEVES, M.A., DIRECTOR, ELEMENTARY AGRICULTURAL EDUCATION

THE teaching of agriculture in the public schools by the routine recitation and language method has proven with us to be of little practical value. Where the school garden is used as an actual laboratory for demonstrating scientific principles worked upon experimentally in the class-room, the subject becomes a live and interesting one related to the activities of the community and giving results that may be compared with those being obtained by the agriculturist. The work taken up in this way is educational. At the same time it gives a favourable incline of thought and action toward many vocational problems.

To secure the best results apparatus, both in the school room and in connection with the garden, is absolutely necessary. The interested successful teacher will be from time to time adding to the supply. Very much of this may be of an inexpensive character. Some of it may be made by the pupils and in this way a personal interest may be attached to its successful use. The age, size and attainments of the pupils enter into the question of quantity and nature of the apparatus to be used.

Following is a list of such material as may be needed. It might be considerably lengthened. Speaking generally, most of what is named is necessary in all schools if satisfactory work is to be done:

INDOOR APPARATUS

Outfits to be used by pupils in chemistry and physics classes.

The necessary chemicals for soil, plant and insect study.

Thermometer, magnifiers, hand lenses, tweezers, scissors, knives, and in large schools, microscopes.

Agricultural charts, cuts of types of domestic animals.

A library containing reference books on agriculture and nature study subjects, year books, reports, bulletins, pamphlets, circulars and a standard agricultural magazine.

Babcock tester in schools in dairy sections.

Sets of weights and measures such as those in ordinary commercial use.

Balance with metric weights (sufficient in number to allow one for every two pupils in a class).

Samples of grain (in sheaf and threshed) collection to be made every fall for winter use.

Clay pots and boxes for seed testing, seed selection and germination.

Large bottle of mixed seeds of the kinds used in gardens and on farms.

Large bottle of mixed weed seeds, such as those often found in the province adulterating economic seed for sale.

A good sized cabinet in which to keep safely chemicals, apparatus, collections, etc., when not in use.

OUTDOOR APPARATUS

A good assortment of garden tools, garden line, measuring tape, stakes and labels, wheelbarrow, hand cultivator, watering can.

Knives for pruning, grafting and budding.

Cold frames, flats.

ONTARIO

BY J. B. DANDENO, Ph.D., INSPECTOR OF AGRICULTURAL CLASSES, DEPARTMENT OF EDUCATION

IN order that the teaching of agriculture may be effective, suitable equipment must be provided with a view to making the work as practical as possible. To meet the needs of the different localities which differ in the kind of agriculture carried on, the teacher selects the material aiming to provide that which will be best adapted to the local needs. The board of trustees pay for the equipment but the money is refunded in full up to a certain maximum.

The store room accommodation for such equipment is not as yet all that could be desired, but improvement in this regard is rapidly being made.

The following list of apparatus is recommended as suitable for elementary classes in agriculture and is intended to be suggestive:

GENERAL

Three small glass funnels.
One-half dozen glass tumblers.
One-half dozen glass fruit jars (sealers).
One dozen large test tubes (1 in. by 6 in.).
Measuring cylinder (graduate 100 c.c.).
Hydrometer, Baumé (for heavy liquids).
Hydrometer jar.
Spirit lamp (with wood alcohol).
Thermometer, chemical, both C and F.
Small bottle of hydrochloric acid.
Small bottle of iodine (in K I).
Two litmus pads.
The following, dry, in large-mouthed, cork-stoppered bottles:—
Sodium nitrate, calcium phosphate, potassium, chloride (or sulphate), copper sulphate, washing soda, baking soda, starch, lime, sulphur.
Filter paper.
Soup plates and saucers, a dozen each.
Flower pots, 3 dozen 4 in.
Flats (boxes for planting seed).
Apple box to demonstrate packing.
Surveyor's chain.
Rain gauge.
Garden tools as may be needed.

SPECIAL

For special purposes, selections from the following may be made:

For Poultry—
Model of feed hopper.
Trap nest.
Model of hen or chicken coop.
Incubator.

For Bee-keeping—
Standard Langstroth hive, complete.
Smoker.
Colony of bees in 10-frame hive.

For Field Crops—
Set of grain measures.
Machine for treating grain for smut.
Samples of grains—wheat, rye, barley, buckwheat, rice in the hull, oats, etc.
Fertilizers.
Weed seeds.

Horticulture—
Pruning and grafting tools.
Hand-spraying outfit.
Hot bed (may be built permanently).
Cold frame.
Combined wheel cultivator and seeder.

For Dairying—
Lactometer.
Babcock milk tester.
Milk scales.
Milk pail (modern).
Butter utensils, for illustration.

SASKATCHEWAN

BY A. W. COCKS, B.SC., DIRECTOR OF SCHOOL AGRICULTURE

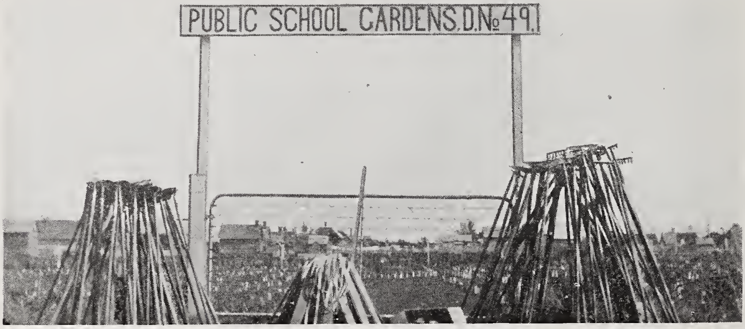
BELOW is given a statement of the equipment used in the public school at Indian Head. It was selected by the principal and purchased by the board of trustees. The staff of the school is held responsible for its care:

(A) EQUIPMENT OF THE CLASS ROOM

Two spirit lamps; 12 test tubes; 1 evaporating dish; 100 vials for collections of soils, seeds, minerals, etc.; chemicals, such as, acids, iodine, Fehling's solution; dishes, plates, saucers, etc.

(B) EQUIPMENT FOR GARDEN

Fifty hoes; 50 rakes; 50 lines 4′ 6″; 375 N.E. stakes, 13″ long x 1″ x 1½″, painted and numbered; 1 tape line marked on one side 4′ 6″ (the width of plots), the other side 5′ 6″ (the length of plots)—about 150′ long; 1,125 stakes painted but not numbered; 6 window boxes, 29″ x 6″ x 6″; 50 narrow boards, for pressing seeds after planting.



THE "HEAVY ARTILLERY" OF THE PUBLIC SCHOOLS GREATER PRODUCTIONCAMPAIGN

This equipment is stenciled "P.S." and stored in a place prepared in the basement. The pupils can reach it as they pass out through the door to the garden. The teachers are required to see that all equipment is replaced in order.

(C) Agricultural books and periodicals in the library.

Many of the rural schools of Saskatchewan are not so well equipped as the school at Indian Head, but the teachers are encouraged to conduct experimental and practical work in the class room and the garden by using the simplest apparatus possible. A spirit lamp; some glass tubing; a balance; a few test tubes, and some re-agents, supplemented by articles brought from the homes of the pupils, such as tumblers, plates, saucers, etc., should be sufficient for the requirements of the average rural school. Pupils can usually bring their own gardening tools.

PUPILS AND GARDEN EQUIPMENT AT THE PUBLIC SCHOOL GARDENS, INDIAN HEAD, SASK.

ALBERTA

As time goes by more and more attention is being given in Alberta elementary schools to instruction of all that appertains to agriculture and gardening. A bulletin of 125 pages, issued by the Department of Education, goes into the matter very thoroughly. Speaking of school garden equipment the outlay for this purpose need not be very large. The tools of course that are absolutely necessary are a hoe, rake, digging fork and spade. There are special tools that are required for special purposes and there are a number of implements that it is always well to have handy. There is no objection to pupils bringing their own tools from home, but for obvious reasons it is preferable that such things should be the property of the school. It is considered that in a school with thirty pupils a teacher will be able to get along nicely with eight to twelve hoes, eight to twelve rakes, four digging forks and two spades. Marking stakes for the corners of the beds and stakes for labelling are a necessity. If these are painted white, and are kept white, they not only add to the attractiveness of the garden in neatness, but they lend themselves better to distinctiveness of labelling.

The following is a list of the articles for school garden equipment that are officially recommended:

1. A hoe and a rake for every two or three pupils—some small, some large, according to the age or ability of the pupils in attendance.
2. A digging fork for every six or eight pupils—some with short handles.
3. A spade for every eight pupils—some with short handles.
4. Several transplanting trowels—four or six.
5. Good measuring tape.
6. Supply of stout cord.
7. One to two sprinkling cans, preferably one small and one larger one.
8. A wheel barrow.
9. Two large mallets for hammering pegs.
10. A lawn mower if lawns form part of the plan for the school grounds.

It will be found to be an excellent plan to provide also a garden work bench, preferably a double bench at which two pupils can work at once, with a set of bench tools such as the following:

1. Work bench and two or, preferably, four vises.
2. Two handsaws, one a rip saw and the other a cross-cut saw.
3. A good jack plane.
4. A hammer.
5. A mallet.
6. A file.
7. A hatchet, a small axe.
8. A brace and set of bits.
9. A pair of cutting pliers.
10. A try-square.
11. A two-foot steel square.
12. A monkey wrench.
13. An oil can, half pint size suitable.
14. An oil stone.

It is important, both from an educational and economical point of view, that pupils should be trained to feel responsible for the care and cleanliness of the tools. Everything should be done to prevent rusting, for there is nothing so wastefully destructive as rust. For this purpose a perfectly dry tool room or shed is required. The tools should be numbered and placed in racks, care being observed to return them in exactly the same order and condition as when taken out. An important part played in the equipment of the garden is the planning, and for this purpose a few of the articles used in elementary landscape gardening could advantageously be secured.

BRITISH COLUMBIA

BY J. W. GIBSON, M.A., DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION

ALTHOUGH great advances have been made in the last twenty years in the matter of securing modern appliances for use in the school-room, there is still much to be done. Maps, books and chalk seem to many school boards to be sufficient for the teacher's use in any and all of the subjects of the curriculum. Equipment and supplies for carrying on even the simplest possible course of instruction in nature study and elementary agriculture are usually rather difficult to get, as very few school trustees understand the work or know what is required in teaching it. Under these circumstances it is necessary that special inducements be offered to school boards in order to have them provide the necessary equipment for teaching elementary agriculture. This can best be done by a system of annual grants towards the expenditures incurred by the board for this purpose.

In British Columbia the work centres around the school or home garden. A certain maximum grant is allowed by the Department to reimburse the board for expenditures made during the year in carrying on a programme of work. An official circular dealing with this question reads as follows:

> "Authorized expenditures on account of rural science and school gardening include such items as rental of additional land for school-gardening purposes; fencing and protection of school gardens; school-garden tools and equipment; hooks, racks, etc., for storing garden tools; hot-beds and cold-frames; garden hose and sprinklers; seeds and seed containers; fertilizers; material for collections of plants, seeds and insects; nature-study apparatus, including weather-recording instruments; special rural-science note-books; reference books on rural science for use of teachers and pupils; and necessary hired help in cultivating the school garden or in caring for it during the summer holidays."

The secretary of the school board submits to the Department a statement of all such expenditures at the close of the year, and on this statement and the classification of the school garden operated the grant to the board is determined.

Agricultural equipment may be regarded as coming under two heads, (1) out-door or garden equipment, (2) in-door or class-room equipment.

1. School-garden equipment recommended as a minimum for an ungraded school of from 25 to 30 pupils —
   - 1 doz. 10-tooth, steel, straight-toothed garden rakes with handles 4 ft. 4 in. long.
   - ½ " boys' garden hoes, 5½ inch blade, solid neck.
   - ½ " girls' garden hoes, 4½ inch blade, solid neck.
   - ½ " light, D-handled spades.
   - ½ " transplanting trowels.
   - 1 " hand weeders (claw or bent steel).
   - 2 push hoes (for mulching plots and levelling paths).
   - 1 light digging fork (D-handled potato fork).
   - 1 light D-handled flat, steel shovel.
   - 1 100-foot garden line and iron reel.
   - 1 tape line (English and metric readings, if possible).
   - 2 watering cans, 2-gallon.
   - 1 galvanized iron pail.
   - 4 pint cups, galvanized or agate.
   - Material for plot pickets and garden labels, white and black paint and brushes, and a few handy tools, such as hammer or hatchet, block-plane, mallet and 1″-chisel, light hand-saw, file, nails, etc.

   As soon as possible the above list should be supplemented by the addition of the following:—

   - 1 wheel-barrow.
   - 2 soil screens, ¼ and 1/12-inch mesh.
   - 1 lawn-mower.
   - 1 bucket spray-pump.
   - 1 combination vice and anvil.
   - 1 wheel-hoe and seed drill (in large schools only, with at least ½ acre under cultivation).
2. Class-room equipment.
   - Reference collection of weeds and weed-seeds, poisonous plants of the district and, where possible, common insects of the most important orders.
   - Materials for making spray mixtures and grafting wax.

Wide-mouth bottles for holding garden seeds: ½ doz. 12 oz., 1 doz. 6 oz., and 1 doz. ½ oz.; ½ doz. quart jem jars for bulky seeds or for stock jars (small tin boxes with close-fitting lids will do as well). All containers must be mouse-proof.
1 doz. plain soup plates (can be used for seed study, as germinating dishes and for many other things).
1 deep dish—tin or graniteware, which can be used for collecting gases over water.
Glass tubing (2 or 3 lb., 3/16 inside).
1 yard rubber tubing, ¼″ outside measurement.
1 alcohol lamp and iron stand.
1 doz. test tubes, 6″ x ¾″.
½ doz. beakers, 200 c.c. and 400 c.c.
4 glass tubes, 18 in. x 1 in. (soil tubes).
1 set of measures—pint, quart and gallon.
1 set trip scales with weights up to 4 lb.
1 doz. shoe-knives with broad blades for root-grafting, etc.
1 grafting chisel.
Litmus and filter paper.
1 4″ glass funnel.
1 graduated cylinder, English and metric, 100 c.c.
2 dairy thermometers or chemical thermometers.
1 barometer.
1 rain gauge.
1 glass cutter.
A few rubber corks, 1-hole and 2-hole, to fit 6 oz. wide-mouth bottles.
1 thistle tube.
2 glass flasks, 4 oz.
Small quantities of a few chemicals, such as iodine solution, Fehling's solution, chlorate of potash, manganese dioxide, zinc clippings, sulphuric acid, hydrochloric acid, nitrate of potash, nitrate of soda, copper sulphate, lime water, extract of rennet and methylated spirits.
A school cabinet with plenty of shelf space and locked doors, where all such supplies and equipment can be safely stored.

The out-door equipment as given above will cost in the neighbourhood of $50, and the class-room list, including the cabinet, about the same amount. It is impossible to estimate the value to the children in our schools of the work which a competent and well-trained teacher can do, making use of such a set of appliances as is herein enumerated.

Agricultural nature study cannot properly be taught without a certain amount of equipment. Resourceful teachers can improvise many simple things, but there is a limit to the patience as well as to the resourcefulness of even our best teachers. It is worth more than $100 every year to any community to have such a really simple and inexpensive equipment as the above for daily use in the study of elementary agriculture. If we are in earnest in this matter of teaching agriculture in these schools, it is high time that we make some attempt to equip our schools and select teachers with that end in view.

STORE-ROOM FOR TOOLS

Most of the schools in British Columbia are provided with commodious basements with play-rooms as well as furnace and fuel rooms. It is customary to board off a small room 8 or 10 ft. square in such a basement for storing garden tools and equipment. Strong hooks and racks are fastened to the walls and some shelving put in. In other cases an addition is built to the woodshed and in this small outside room the garden equipment is stored. The proper care of garden tools should be insisted on from the start.

A garden class-room with facilities for storing tools is best of all. It is placed in or beside the garden and can be used for various things for which the ordinary school-room is unsuitable. It is fitted up with a work-bench at one end and soil benches 24 to 30 inches wide, along both sides. It should be not less than 12 ft. x 20 ft. and for a large class a few feet longer. It should have good light, and be high enough to allow for storing hot-bed sash, etc., overhead. In such a garden house classes in nature study and agriculture can be conducted with materials such as soils, grains, weeds, vegetables, etc., which cannot so well be carried on in the regular school-room. It is sometimes possible to fit up the "old school" as an ideal garden and agricultural class-room.

SCHOLARSHIPS FOR HOUSEHOLD SCIENCE

NEW BRUNSWICK

BY MISS HAZEL E. WINTER, SUPERVISOR OF WOMEN'S INSTITUTES

IT has been the custom in this province to pay the railroad fare of women attending Macdonald College, Macdonald Institute and the Nova Scotia Agricultural College to take up the Household Science course.

SASKATCHEWAN

IN view of the fact that there is not in Saskatchewan a school of household science at which farmers' daughters may acquire a proper training to fit them for their life work, arrangements were made in 1909 to provide scholarships to encourage the young women of the province to attend such institutions in other parts of the Dominion. Since this plan was adopted, seventy-three scholarships have been awarded. The courses were taken at the Manitoba Agricultural College, and a smaller number trained at Macdonald Institute at Guelph and Macdonald College at St. Anne de Bellevue, Que. The scholarships and regulations regarding them are as follows:

1.	To each student from Saskatchewan passing with first class honours in her first year (The winner of No. 3 is not eligible to compete for this scholarship).	$ 75.00
2.	To students from Saskatchewan passing in all subjects of the first year (Winners of No. 1 and No. 3 are not eligible to compete for this scholarship.)	50.00
3.	To the student from Saskatchewan standing highest among the students from Saskatchewan in general proficiency in the work of the first year	150.00
	FOR SECOND YEAR STUDENTS	
4.	To each student from Saskatchewan graduating with first class honours on completion of the regular two years' course	100.00
5.	To students from Saskatchewan passing at the end of the second year in all subjects of the regular two years' course (The winners of No. 4 and No. 6 are not eligible to compete for this scholarship).	75.00
6.	To students from Saskatchewan standing highest among students from Saskatchewan in general proficiency in the graduating class on completion of the regular two years' course	150.00

Any student from Saskatchewan at any of the colleges named herein though otherwise eligible to compete for scholarships Nos. 3 and 6 shall not be awarded one of such scholarships unless there are in her class at least five Saskatchewan students eligible to compete for either of the said scholarships.

Scholarships are not offered for third or fourth year work.

In awarding scholarships the work of the entire college year will be considered.

Scholarships will be awarded and paid as they fall due upon receipt of reports from the principals of the respective colleges showing the standing of the students from the province.

Students winning scholarships must furnish proof satisfactory to the Minister that they have been *bona fidé* residents of the province for at least two years immediately before entering college and that during that time they have spent at least two summers in practical work in a farm home.

BRITISH COLUMBIA

BY W. E. SCOTT, DEPUTY MINISTER OF AGRICULTURE

THIS Department makes an allowance of $50 a term for any *bona fidé* British Columbia woman who wishes to attend any of the agricultural colleges in Canada for the purpose of taking a course in domestic science. There are, of course, two terms in the year, which is the equivalent of a grant of $100 per annum. This has been in effect for a considerable number of years, but as soon as our provincial university gets properly started, it will be discontinued.

I attach herewith a statement giving the number of women of this province who have taken advantage of this offer for the last few years.

In connection with our women's institutes, short courses and lectures have been given in the past on matters of domestic science, the Department supplying the lecturer or demonstrator. This educational work has undoubtedly been productive of very good results.

PROFESSIONAL COURSES

Two-Year Normal Course:
Miss Frederica Oliver (1911-13).
Miss Mildred E. Ruttan (1916-18).

One-Year Normal Course:
Mrs. Carrie H. Burns (1910-11).

Housekeeper Course (2 Year):
Miss Sibylla Hadwen (1908-10).
Miss Mabel Witmer (1915-17).

NON-PROFESSIONAL COURSES

Associate Course (2 Year):
Miss Margaret H. Davis (1913-15).
Miss Mary Steele (1916-18).

Homemaker Course (1 Year):
Miss Elizabeth B. Lineham (1915-16).
Miss Elma M. Lineham (1915-16).
Miss Mary C. Stevenson (1911-12).
Miss Olive J. Buchan (1910-11).
Miss Edith Beard (1910-11).
Miss Rose Palmer (1907-8).
Miss Elma Bell.

Short Course in Domestic Science (3 Months)
Miss Eva Beard (1911).
Miss Muriel Gibson (1910).
Miss Phyllis Slater (1916).
Miss Olive Wilson (1911).
Miss Emily Bradley (1910).

Short Course in Sewing:
Miss Hattie Thomson (1908).

ONTARIO

AGRICULTURAL TEACHING IN THE PUBLIC AND SEPARATE SCHOOLS

IN 1916, 752 public and separate schools qualified for grants according to the regulations of the Department of Education. Under this scheme one of two plans may be adopted both of which require the teaching of agriculture in class for at least one hour a week throughout the school year. Home gardens or school gardens are also essential. The equipment needed for instruction in agriculture is fully paid for in the form of grants to the boards, providing the money has been spent as indicated in the regulations. These details are given in Circular 13, 1917, pages 6 and 7.

Reports concerning this work are given in detail in the blank forms supplied by the Department of Education for the purpose. In this way the head office is in close touch with the actual work carried on in the various schools. The inspectors are requested by regulation to pay special attention on the occasion of their regular visits to the teaching of agriculture and to report to the Department on special forms provided. For the special work of inspection an allowance is made—six dollars for each school taught by a teacher holding a certificate in agriculture and four dollars for each school where classes in agriculture are under the charge of a second-class teacher. The teaching of agriculture is recognized only in Forms III, IV, and V, and in these classes there were in 1916 over 13,000 pupils at a cost of about 75 cents a pupil per year.

AGRICULTURE IN THE HIGH SCHOOLS

Twenty-one secondary schools conducted classes in agriculture in 1916, with about 600 pupils. To promote the teaching of agriculture in the secondary schools, allowances are made to Boards for the purchase of equipment, and to the teacher for conducting the work. The maximum allowance to Boards is $100 for the lower school course and $100 for the middle school. In each case there may also be an allowance of $80 for the lower school and $80 for the middle school to the teacher on the subject.

NORMAL SCHOOLS

Instruction in agriculture is given in the Normal Schools to meet the needs as far as possible of the inexperienced rural school teacher. The following topics, with some attention to methods of teaching the subject, are taken—dairying, poultry, field crops, horticulture, birds and insects, experimental plots, school gardens, home projects, and care of school grounds.

To procure special equipment for teaching these topics, use is made of the funds supplied by the provisions of THE AGRICULTURAL INSTRUCTION ACT.

MANITOBA

SUMMER COURSE IN AGRICULTURE FOR TEACHERS

THE Manitoba Agricultural College is offering to teachers a three-year course leading to the degree of B.S.A. Teachers holding first-class or second-class professional certificates may complete the first year's work in three summer courses of six weeks each, which will qualify them to enter the fourth year of the regular B.S.A. course. The first year's work is divided into the following nine groups of subjects, and three of these groups will be covered each summer:

OUTLINE OF STUDIES

1. Cattle, Horses, Veterinary Science.
2. Sheep, Swine, An. Chemistry.
3. Dairying, Dairy Bacteriology, Poultry.
4. Soil Bacteriology, Soil Physics, Soil Chemistry, Soil Cultivation, Principles and Methods.
5. Weeds, Cereals, Legumes, Grasses.
6. Vegetables, Fruits, Flowers.
7. Farm Accounts, Farm Management, Rural Economics.
8. Forge Shop, Gas Engines, Cement.
9. Wood Shop, Building Construction, Farm Homestead.

This work is practically the same as that of the first year of the regular winter course.

A teacher holding a first-class professional certificate will be qualified to act as principal of a high school or collegiate institute upon receiving his B.S.A. degree in this course; while a teacher holding second-class professional standing will be qualified to act as assistant teacher in a high school or collegiate.

The present summer course opened on July 3rd, and will continue for six weeks from that date. The number of students attending is six (five men and one woman).

SASKATCHEWAN

EXHIBITION OF SCHOOL GARDEN PRODUCTS

As evidence of the public interest in school gardening the action of the exhibition boards of the province in providing prizes for school garden products may be cited. A particular example of this is indicated in the arrangements made by the Provincial Exhibition Board whereby provision has been made for a special class in which prizes will be given for the products of school gardens in accordance with the following rules:—

(1) All exhibits must have been grown in a public school garden or plot and cared for by the pupils of the schools making the exhibit.

(2) Not more than one exhibit may be made by any one school.

(3) Entry must be made in the name of the school not later than June 30th, 1917, and the entry must be signed by the teacher of the school at the time the entry is made. It is unnecessary to state the kind of vegetables to be included in the collection. No entry fee is required.

(4) Each exhibit must consist of a collection of not less than six kinds of vegetables and may be composed of any six of the following kinds and in the quantities stated: 36 pods each of peas and beans; 3 heads each of lettuce, cauliflower, cabbage; 12 each of radish, carrots, beets, turnips, onions, potatoes.

(5) For the purpose of this competition the province has been divided into four sections, viz., south-east, south-west, north-east and north-west. Each division is subdivided into two sections, viz., rural schools and town or city schools; the northern divisions being separated from the southern by the South Saskatchewan and Qu'Appelle rivers; the north-eastern from the north-western by the third meridian and the south-eastern from the south-western by the eastern boundaries of the Regina and Radville inspectorates.

(6) The prizes in each section are:— 1st, $10; 2nd, $8; 3rd, $6; 4th, $5; 5th, $2.

THE SCHOOL FAIR AND RURAL CITIZENSHIP

BY J. T. M. ANDERSON, M.A., LL.B., INSPECTOR OF SCHOOLS, YORKTON

No movement in rural districts of the Prairie Provinces is accomplishing more to develop a public spirit in the various peoples than the Union School Fair.

In these provinces, where there is such a large number of "foreign" settlers, educators have been greatly interested in this work, and during the past two or three years remarkable progress has been made. During the year 1916 dozens of successful fall fairs were held in connection with the public schools, and the results tend to indicate that this comparatively new idea in rural education, will form an important factor in the solution of the rural problem.

As a concrete illustration of the school fair as a social and educative factor in community betterment and rural advancement, a series of fairs held in North-Eastern Saskatchewan during the fall of 1916 may be referred to. Early in the spring prize lists were issued by a central committee and fairs arranged for at fourteen different village centres. The rural schools in the vicinity of each centre were asked to co-operate in preparing exhibits for the fall fair to be held at this centre. Immediately there was aroused a wider interest in rural school life. The school and home gardens were carefully prepared and throughout the year received careful attention. The drawing, sewing, and manual classes were conducted with a view to producing creditable work for the fair. The children's exercise books were more neatly kept than ever before, and this suddenly increased interest resulted in better and more thorough work in all branches of the public school course. Hand work was emphasized as never before and the work of hand and mind correlated in most encouraging fashion.

A visit to any of the hundred schools participating showed a better and more regular attendance and a better school spirit generally prevailed. In addition to this there was a wide interest on the part of the parents, thus bringing nearer to realization that most desired sympathetic co-operation between the school and the home. The teachers, too, profited from the opportunity afforded of meeting together regularly to discuss arrangements for the fairs, and a live interest in their work was manifested throughout the year. Trustees responded liberally to requests for financial and other assistance and more than ever before these important officials displayed a marked interest in the performance of those duties which too often in the past have been but slightly regarded.

The fairs at the village centres were held on Monday, Tuesday and Wednesday of the last week of September and all the prize-winning exhibits were sent to the town of Y———, where a very large fair was held on Friday and Saturday of the same week. At each village fair from five to thirteen rural schools took part with the result that one hundred schools were represented in the large central exhibition.

On the day of the fair the teachers were in the village early preparatory to unpacking and arranging the exhibits. In many cases the parents provided conveyances to bring in the country children. The rooms of the village school were tastily decorated with flags, mottoes and banners; all branches of school work were represented. Long tables were laden with choice vegetables grown in home or school gardens. Maps, drawings, specimens of writing, essays and exercise books, testified to work done in the school-room. Hand work of various kinds, including paper-cutting, weaving, basketry, woodwork and modelling formed a most attractive display, while the exhibit of bread, cakes, and pastry was most creditable.

At most of the fairs the older pupils were placed in charge of the exhibits, and readily answered any inquiries on the part of visitors. In this way they were getting a valuable training for after life. At several centres girls from the senior grades served tea, and in this way collected substantial sums for the Canadian Red Cross and Belgian relief funds.

About four o'clock in the afternoon a concert was held, each rural school contributing two or three numbers to the programme. In this way the spirit of co-operation was still further substantially encouraged. Addresses by public men and prominent citizens of the various districts constituted another striking feature of these gatherings, and all who spoke emphasized the fact that "education is training for a happy and useful life".

Eighteen different nationalities were represented in the schools participating in these fairs. At one centre children of Bohemian, Hungarian, Swedish, German, Belgian, and Polish parentage, took part and their parents mingled freely as they proudly examined the work of their respective children; at another fair boys and girls of Ruthenian, Scotch, Welsh, Assyrian and English parents had their work arranged side by side on the long tables. But throughout the whole fair the children used no language but English.

The prize exhibits from each of these fourteen centres were sent to the town of Y———, where a very large union school fair was held. There were over two thousand entries and more than one hundred teachers attended.

The rural problem in our foreign settlements will never be solved until the home and the school become more closely united and work together for mutual improvement. Our idea of "fairs" has too long been confined to exhibits of dairy cattle, thoroughbred horses, fancy dogs, and horse-races. Let us in future devote more attention to the proper rearing of the youth of the land! Let us have children with strong, well-developed bodies and alert, carefully-trained minds! Let us turn our attention to this great problem of laying a solid foundation for the Canada of the future!

BRITISH COLUMBIA

SCHOOL GARDENING IN THE PROVINCE

DURING the year 1916, school gardening was carried on systematically in one hundred and forty-five different schools by two hundred and twenty-five teachers, and in addition to this, home gardening was carried on in twenty-five schools. The home gardening work is closely supervised by the teachers, and is reported on in June and in September. Carefully prepared reports are also furnished twice a year by all teachers taking up school gardening. Agricultural nature study has a prominent place in the public schools of the province.

In a statement with regard to "Food Conservation," W. J. Hanna, Food Controller for Canada, said:—There are some measures that are so obviously right that we ask that they be adopted at once, and that the men and women of the Dominion pledge themselves to their observance. They include:

Maximum production; the largest possible production of perishable foodstuffs in order to liberate the storeable foods for transportation; the adoption of war menus; the prevention of food waste; the utilization and creation of organized volunteer bodies to assist the Food Controller in increasing and conserving the food supplies.

The food problem of the Dominion is not measured by the domestic market, but by the needs of the Allied armies and nations. They require tremendous supplies of wheat, meats, fish, cheese, beans, canned and evaporated foods and other commodities. They cannot be rationed unless the Dominion saves such foodstuffs for export. Fruits and vegetables in their seasons should be the country's foods to the greatest possible extent.

Public realization of the true food position is imperative. Food conservation is imperative to win the war.

PART IV

Special Contributions, Reports of Agricultural Organizations, Notes and Publications

ACTS RELATING TO AGRICULTURE

COLD STORAGE

Cold storage, by reason of the extra necessity for the preservation of perishable articles of food, has in the last few years considerably increased in importance. The legislation directly relating thereto has been neither of an extensive character nor of a lengthy description. The Dominion Parliament has adopted two measures of the kind, one in 1907, entitled "The Cold Storage Act," and another in 1914 entitled "The Cold Storage Warehouse Act." These Acts are administered by the Dairy and Cold Storage Commissioner. Nova Scotia and New Brunswick of the provinces alone have measures on the statute books of the nature referred to.

THE DOMINION ACTS

"An Act to encourage the establishment of cold storage warehouses for the preservation of perishable food products"* is the descriptive or long title of the Dominion Cold Storage Act. It repealed "an Act respecting Cold Storage on Steamships from Canada to the United Kingdom and in certain cities in Canada", passed in 1897, and consists of ten sections. The Governor in Council is authorized by the Act to enter into contracts for the payment of subsidies on public cold storage warehouses equipped with mechanical refrigeration, and suitable for the preservation of any food product up to thirty per cent of the amount expended on the construction and equipment thereof. Payment is made as follows: fifteen per cent at completion, seven per cent at the end of the first year, four per cent at the end of the second year and two per cent at the end of each of the two succeeding years. Upon the Minister of Agriculture rests the responsibility of deciding whether the grants have been duly earned or not, and he is given absolute power of inspection and supervision over the operation and maintenance. An applicant for the subsidy must not only submit a full description of the proposal, but must also show that there is need for public cold storage in the locality where it is proposed to erect a warehouse. The rates and tolls must be approved by the Governor in Council, who also is empowered to make such regulations as are advisable, by the violation of any of which a penalty not exceeding $50 is incurred.

Some account of the working of "An Act to regulate Cold Storage Warehouses", assented to June 12th, 1914, was given in THE AGRICULTURAL GAZETTE, Vol. II, page 1049. The Act describes the meaning of cold storage as the storing of articles of food at or below a temperature of forty degrees Fahrenheit, and a warehouse, as referred to in the Act, as an establishment in connection with which refrigerating machinery, or ice or salt, is used for the maintenance of that temperature and in which articles of food are stored for periods not exceeding twenty-one days. Regulations to be made by the Governor in Council are to provide for licensing, inspection, reports showing the quantities of food in storage, limiting the period of storage, and for labelling or marking of food products when they go in and when taken out. Owners, managers, storemen and other employees are enjoined to offer every facility for the performance of their duty to a fine not exceeding two hundred dollars or to imprisonment for six months or to both fine and imprisonment.

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*Before this law came into force, the larger centres had been provided with cold storage facilities, so that the development of the industry, under the stimulus given by this legislation, and the subventions which it provides for, has been largely along the line of the erection of comparatively small local warehouses situated in the producing centres of Eastern Canada. In this way, storage facilities are provided as near as possible to the point of production and the goods are placed in cold storage with the least possible loss of time or chance for deterioration.

THE NOVA SCOTIA ACT

The Nova Scotia Act was passed in 1897 and is embodied in the Revised Statutes of the province of 1900. It provides that the Lieutenant-Governor in Council may grant aid to a properly equipped cold storage establishment by guaranteeing the annual interest upon a sum of money for a period of years, or the annual dividend upon shares of the capital stock of a company, or by an annual subvention. The order-in-council authorizing such aid may contain provisions for representation upon the board of directors, for fixing the rates of storage, for inspection of the books and accounts and such other provisions as may be deemed advisable. The order-in-council may embody, or be accompanied by, a form of contract. The aid is not to exceed $2,000 in any one year and not to be granted for any period exceeding three years.

THE NEW BRUNSWICK ACT

"Respecting Aid towards providing cold storage for agricultural and other Products" is the descriptive title of the New Brunswick Act. Its provisions are much the same as those of the Nova Scotia Act, but are given at greater length. They set forth that the Lieutenant-Governor in Council may grant aid by guaranteeing interest or dividends, or by an annual subvention, towards the erection and equipment of a cold air storage depot in the city of St. John and auxiliary depots as circumstances may justify in other suitable localities. As a condition of this aid it is provided that the Lieutenant-Governor in Council shall have the making of the rates to be charged for storage and the making of regulations for inspection and general supervision. The aid in the aggregate must not impose upon the province a liability in excess of $7,500 per year and must not extend for a longer term than seven years. Special provision is made in the Act for guaranteeing the bonds of the New Brunswick Cold Storage Company, Limited, to the extent of $60,000, but not in excess of 75 per cent of the actual cost of the buildings and plant. The rate of interest is set at 4 per cent and the bonds are payable in 40 years. Insurance must be maintained in the usual way, or, by an amendment passed in 1915, the Lieutenant-Governor in Council can accept the guarantee of the Canadian Pacific Railway Company in lieu of such insurance. Reports have to be filed semi-annually and the Lieutenant-Governor in Council has the approval of the salaries paid. The title to the lands, buildings and plant is vested in the Crown until the bonds are redeemed. The Provincial Secretary and Commissioner of Agriculture for the province are *ex officio* members of the board of directors.

THE COLLEGE AND RURAL LEADERSHIP

FROM ANNUAL REPORT, 1916, OF PROF. J. B. REYNOLDS, PRESIDENT, MANITOBA AGRICULTURAL COLLEGE

It is a perfectly obvious fact that if the influence of the college in the province were measured by its ability to turn out two or three or four hundred good farmers and good housekeepers each year, who after leaving the college should retire at once into private life, and turn the knowledge and skill they have gained at the college into private advantage and profit, then that influence so measured would not justify its existence. The college could not thus make an adequate return to the province for the money that it costs to operate it.

The whole province supports the agricultural college, and the whole province should gain from the work of the college—else it falls short, and fails. What have we a right to expect from young men and young women who have spent one, two or more years at the college studying the problems of farm and home and community? A fair measure of success in managing their own affairs? Yes, and something more than that. We expect public spirit, active citizenship, an enthusiasm in all things that make for a better community life.

I have seen the desire for private business diminish in young men who have spent some years at college. I have seen the desire to "farm on their own account" fade away, and be replaced by another desire, the desire for public service. And it is in public service, whether professional or amateur, that the agricultural college graduate can repay the obligation he owes to the province for the education received.

by inspectors or other officers who may be appointed under the Act. The measure does not apply to refrigerated rooms in connection with hotels, restaurants, dining-car services, retail shops, private houses, manufacturing houses other than packing houses, refrigerator cars or steamships with refrigerated space. Contravention of any provision of the Act brings liability

The agricultural college idea is the idea of a wholesome and satisfactory country life, and we try to inspire our students with that idea. Those who come adequately under the influence of the college do, I believe, accept that idea, and whether they are farmers, home-makers, teachers or preachers, they do, more or less, try to make the gospel of rural life prevail.

In 1916 the college taught 358 students in long courses and 365 in short courses. Who were these in the short courses? Chiefly, two classes of students—public school teachers and rural ministers. These two classes of citizens may exert a tremendous influence on country life. They may, directly and indirectly, in season and out of season, help to make country work a greater material success, by understanding some of the problems in country work, and, by hint and instruction and leading, bring about better farming. They may do more. If these teachers and preachers have a sense of rural values, of the interests and attractions possible to country life at its best, they, as rural leaders, may cultivate in children and grown people that sense of rural values, and help to make that life interesting and attractive.

That purpose is at the foundation of the nature study and agriculture and home economics and rural sociology which the rural teachers and rural ministers and ministers' wives learned, if ever so hurriedly, at the agricultural college.

Possibly one hundred and fifty of these teachers and ministers went from the college to the country. We cannot hope that all of these comprehended fully the agricultural college idea. But we know that many of them did, and we know that many have become effective agents in taking the college to the country.

EDUCATION FOR COUNTRY LIFE

There has been no serious, well-considered attempt yet made in this country to turn the minds of children, by the education received in the schools, towards country life. The suggestions and implications and ideals of the school books do yet, for the most part, point towards the town. We need some new text-books, if only an arithmetic, that contains some probable farm problems or a history that starts right in the community where the school is situated, or a commercial geography that enables the children to discover how important in the commercial affairs of the world are the products grown on their own farms. And, to make adequate use of such text-books, we need secondary schools that will train the future teachers in these rural ways of thinking, and that will surround them with a real rural atmosphere.

To solve the problem of education for country life, it is necessary to "ruralize" the teachers who are to teach in the rural schools. These teachers must have a knowledge of the actual conditions and problems of the farm, a love for country life, and a faith in its material and social possibilities. How can we get such teachers? We may not be able to get them, enough of them. But one thing is sure: we have not yet gone the right way to get them. The teachers, for the most part, have been trained in secondary schools situated in large towns and cities. The teachers engaged in the secondary schools have in turn been taught in the university. There is little chance for the rural idea to enter there, except by accident of taste and disposition.

I have suggested to the Department of Education, and the Department has favourably considered the suggestion, that the principals of some of our secondary schools should be graduates of the Manitoba Agricultural College. For such principals, the Department of Education guarantees the academic standing, and the Agricultural College guarantees the standing in agricultural science. With the principal of the school proficient in agricultural science, and interested in agriculture and country life, there will be a good chance of giving the education in the school where the future rural teacher spends three years, some such turn as Mr. Cummings has given it in his school at Teulon.

Already, in accord with this policy, we have at the college three men entered on a course fitting them to direct agricultural teaching in the secondary schools.

The work done by the Normal schools of this province, in fitting the teachers so far as possible for country work, is deserving of all praise. I know more particularly the schools at Brandon and Winnipeg, and I know that the principals and the teachers there realize the importance of this work, and are doing their best to accomplish it, But six months at the Normal school, even if a month is added at the agricultural college, cannot supply the deficiency of the secondary or high school course. The solution of the problem is the ruralized secondary school.

The Minister of Education and the Deputy Minister have shown their determination that this shall be done, and they are generously allowing the agricultural college to co-operate. The college hopes by this opportunity to help in supplying the missing factor in the secondary education in the province, and through the secondary school to help in supplying the missing factor in the rural schools.

THE ORGANIZATION OF RESOURCES COMMITTEE IN ONTARIO

TO what extent the work of the Organization of Resources Committee, formed under a special Act of the legislature of Ontario, has been successful cannot be fully and definitely known until the harvest has been garnered and the season of cultivation and growth has entirely passed. With the presentation of a report dated June 11th, it can fairly be said that the first half of the committee's work for this year has been completed. Soil preparation and seeding are over and care and anxiety has set in as to what the outcome will be. Watchfulness to prevent inroads of insect pests and plant diseases and to suppress the weed evil are now in order until ripening and reaping time comes around. For the present, then the labours of the committee have slackened in so far as organization for preliminary purposes is concerned, but there will be no relaxation of effort and interest, for it is recognized that the busiest period of the year, harvest time, is yet to come, and that then will be heard the most persistent cry for additional labour. Even with harvest over, the committee will not cease its efforts, for it is proposed to take full advantage of the facilities for advertising, and the encouragement of increased energy, offered by the fall exhibitions throughout the province.

COMPOSITION OF THE COMMITTEE

The committee is an influential organization, having the Lieutenant-Governor for chairman, the premier of the province and the leader of the opposition in the legislature for vice-chairmen; Albert H. Abbott, Ph.D., for secretary, and a score of members, including provincial cabinet ministers, members of the Legislative Assembly, the Commissioner of Agriculture, prominent business and professional men and agriculturists.

AIMS AND OBJECTS

The Act sets forth the objects of the committee as follows:—

> To aid in securing the conservation, utilization and organization of the resources of Ontario for the successful prosecution of the war, and to secure the increasing and maintaining of the agricultural and industrial production of Ontario and the better development of the natural and other resources of the province during the war and thereafter.

Proceedings opened with sending out a four-page foolscap size circular entitled "The Crisis," pointing out the alarming state of the food situation all the world over and the consequent urgent need for increased production. It showed that in Ontario alone there was a shortage of food stuffs in 1916 as compared with 1915 of 48,600,517 bushels. A four-page leaflet followed detailing the objects of the Committee, the assistance that was expected from District Representatives and other Departmental officials, to each of whom a special circular was addressed, and the policy that was to be followed. The second paragraph of this leaflet declared:—

> The purpose of the present organization is three-fold; (*a*) To secure all available labour from cities, towns, and villages to work on farms. (*b*) To create such an attitude in the farmer that he will seed as much land as possible with the labour available, and that he will be willing to do the best he possibly can with the kind of labour which can be secured for harvest. The Organization of Resources Committee takes the attitude that the farmer should seed as much land as possible, trusting to the work of the branch committee in his county to see to it that men are available to harvest the crop. (*c*) To form an organization which will be sufficiently permanent in character to carry on the work begun this spring into the fall and next year.

The leaflet recognizes all other production organizations as auxiliaries and urges their co-operation.

ACTIVITIES OF THE COMMITTEE

A third circular goes further into particulars of the duties the committee has assumed, outlining at the same time its plans and the co-operation that was expected. This circular states that the first aim of the Committee was to promote increased production by the use of modern machinery, and, the second, to encourage the cultivation of back-yards, vacant lots and waste places. The ladies had organized for the purpose of encouraging the utilization of back yards. The War Production Club of the Board of Trade had undertaken to have the premises of soldiers' wives dug for them and the Horticultural Society was supplying the seed. Rotary Clubs were also assisting. The War Production Club had added five tractors to those being put out by the Provincial Department of Agriculture. Efforts were being made to increase the supply of labour. For the encouragement of high school boys to get out and work, an essay competition had been promoted. Girls were being placed on fruit farms and being looked after by the Young Woman's Chistian Association. A number of men had also been released by firms and business corporations to spend the summer on farms.

ORGANIZATION PLANS

The Committee was acting in unison with the various Boards of Trade in their proposition to secure an extension of holidays, so that the employees could undertake farm work. A plan had been adopted whereby existing organizations would have an eye to the requirements of their respective counties. The idea was to organize each county as a unit, in furtherance of which plan meetings had been called throughout the province of bank managers, business men and professional men generally as well as farmers. An extensive newspaper advertising campaign had been undertaken. Employment bureaux had also been opened. The active and energetic co-operation of the District Representatives of the Provincial Department of Agriculture was being received. Many other questions, such as wages, length and times of service, and so on, were considered, and an urgent appeal was made to farmers for sympathetic co-operation.

LABOUR ALREADY PROVIDED

In the report to the executive dated June 11th it was stated that, while no reports had then been received from the local committees, 1,040 men had been placed by the War Production Club of Toronto, of whom 800 had gone for the whole season. The various employment bureaux had also, so far as known, sent out 499 men, 593 boys and 624 women and girls. In addition to these a number of both sexes had been placed by the District Representatives, while the Provincial Department of Education reported that 5,000 boys and 2,000 girls had left the schools to work on farms. Altogether, the report said that about 9,000 men, women, boys and girls had been placed. In addition many had gone from industrial plants throughout the province.

In a summary of the situation the report said:—

> From the reports of the District Representatives, it is evident that the acreage under cultivation will be considerably larger than last year. The cultivation of vacant lots and the many back-yard gardens will also have due effect in increasing food production. Your Executive Committee feels however, that results, apart from food production, have been accomplished which are of great value at the moment and absolutely essential if the work of this Committee is to have the best possible results. In a conference with the editors of the farm papers of Ontario, it was brought out that the general attitude of the farmer was not as sceptical in relation to the greater production campaign as it was, even a month ago, and that the town and city men were learning much about the actual work of the farmer which was broadening their co-operation with him.
>
> More than that, the movement to enlist boys for farm work has taken on a much broader aspect, which is very significant for the future. The Y.M.C.A. and the National Boards of the religious denominations of the Dominion through their boys' work departments, have considered, and officially endorsed, a plan which has been named, "Soldiers of the Soil Movement." Each of the several denominations participating is now promoting this movement which has for its aim, the enlistment and encouragement of boys in food production, the providing of attractive incentive for keeping them interested in their work and the relating of this service to their religious growth and development.

SUB-COMMITTEES APPOINTED

Bulletins in furtherance of the work had been prepared and were being liberally distributed. Arrangements had been made with the Bankers' Association for the provision of loans to purchase seed. A sub-committee had been appointed on fish as a food and as a result 200,000 copies of a pamphlet entitled "Ontario Fish and How to Cook Them" had been circulated. Committees had also been appointed on Economy and the Prevention of Food Wastage and on Poultry. The Secretary of the latter reported that 25 meetings had been held in different parts of the province and that a great deal of promising interest had been manifested.

EYES ON THE FUTURE

The Committee had taken deep interest in the employment of tractors on the farm and understood that additional machines were to be put out for the fall ploughing. A materially beneficial effect was expected on the crops of 1918. Steps had been taken to co-operate with the Provincial Department of Agriculture in utilization of the fall fairs for advertising purposes.

The report states that in order to promote increased production and to secure permanency in the efforts that are being made, a number of field secretaries have been engaged who will spend the summer months visiting various parts of the province and perfecting county organization.

In concluding the report remarks that "As this committee is looking forward to the work of next winter and the production of 1918, it is evident that all the work which we do now should have the winter and next year in view quite as definitely as the securing of labour for farmers this year."

A LADIES' CO-OPERATIVE COMMITTEE

At a meeting of ladies held in the Parliament Buidings, Toronto, on July 12th, a committee of co-operation was formed with the following members: Lady Hendrie, Chairwoman; Lady Hearst, Mrs. Rowell, Mrs. Torrington, Mrs. H. D. Warren, Mrs. Arthur Vankoughnet, Mrs. L. A. Hamilton, Mrs. A. E. Gooderham, Mrs. Jacob, Mrs. W. O. Duncan, Miss Marie Macdonell and Miss Marion Findlay.

It was also decided to call a province-wide conference of women, with a view to organizing the women of Ontario for the conservation of foodstuffs to prevent waste and for the advocacy of thrift and economy in the home. At a subsequent meeting of the ladies' committee it was decided that the conference should be held from July 19th to 26th, three delegates to come from each centre, the Provincial Government to pay their expenses.

OFFICIAL WEIGHTS OF VEGETABLES, GRAINS AND SEEDS

THE following table gives the official weights per bushel of the standard classes of vegetables and grains, and the seeds of grasses and clovers:

VEGETABLES

DESCRIPTION OF ARTICLE	Weight in Dominion Standard Pounds, Per Bushel
Artichokes	56 lb.
Beets	50 "
Carrots	50 "
Onions	50 "
Parsnips	45 "
Potatoes	60 "
Turnips	50 "

GRAINS

Barley	48 lb.
Buckwheat	48 "
Flax	56 "
Indian corn	56 "
Oats	34 "
Peas	60 "
Rye	56 "
Wheat	60 "

GRASSES

Blue grass	14 lb.
Timothy	48 "
Alsike	60 "
Lucerne	60 "
Red clover	60 "

ASSOCIATIONS AND SOCIETIES

PRINCE EDWARD ISLAND DAIRYMEN'S ASSOCIATION

AT a meeting of the Prince Edward Island Dairymen's Association the following resolution previously approved at a meeting of the directors of the association was passed:

"Resolved that the directors of the Dairy Association be a committee to draw up a definite plan of co-operation and secure a competent man from the provincial Government to improve the dairying industry and particularly co-operation in the marketing of products and the purchase of supplies."

THE QUEBEC HOMEMAKERS' CLUBS

AT the fourth annual convention of the Homemakers' Clubs of Quebec held at Macdonald College on June 20 and 21, 62 delegates attended. In the absence of the principal, Professor Lochead delivered the address of welcome, placing special stress upon the splendid work women were doing in response to demands created by the war.

Mrs. N. C. Macfarlane, Demonstrator for Homemakers' Clubs, presented the annual report which showed that during the year five new clubs had been organized, that the appointment of an assistant demonstrator in Miss Babb, a graduate from the Macdonald Institute, Guelph, had proved helpful, that 28 demonstrations in preparing and serving school lunches had been given, in consequence of which two academies had been equipped with the conveniences for serving hot lunches, that 57 demonstrations in canning, bread-making and cake-making were given to school children, that every encouragement was given to boys and girls to form canning clubs, that material assistance in school-fair work had been received from the school of Household Science through the Extension Department, that a bulletin on the Home Canning of Fruits and Vegetables had been distributed, that $4,000 in goods and cash had been contributed to Red Cross work, that the Sawyerville Club headed the list in Red Cross work with $692.29, that eight organization meetings had been held and a number of visits paid to school fairs, that county executives can do a great deal towards strengthening branch clubs, that beneficial effect will result from interesting husbands and sons in the work of the clubs, that the Provincial Minister of Agriculture was waited upon and asked for assistance and that he promised the Government would pay for necessary handbooks and for printing the report of the annual convention, that there are clubs in thirteen counties and that efforts should be made to interest the voters and the local representatives in the legislature, that 91 addresses were given during the year by the demonstrator and 2 each by members of the Schools of Household Science and Agriculture, that 16 applications were received for the travelling libraries, that 155 applications for literature were received from the circulating library, that the clubs hold meetings to further the education of boys and girls and that leading educationists be invited to attend, and that the clubs believe with the mothers' clubs of America that "no reform politics, no remedial legislation, no readjustment of wealth can effect much progress until the parents of the coming generation are adequately trained guardians of their children." Sorrow was expressed for the passing of Sir William Macdonald, and regret for the resignation of Miss Fisher, principal of the School of Household Science.

At the different sessions addresses were given on "Music as a Factor in the Home and the Community", by Mr. G. E. Stanton, on "Labour Saving Devices", by Miss Fisher, and on "Water Supply in the Farm Home and Home Plans", by Mr. Starrak. Miss Babb gave a demonstration on "Home Canning and Jelly Making", and Miss Thackeray opened a discussion on "The Sale of These Products", Miss Armstrong on "Girls' Clubs", and Mr. J. E. McOuat, Demonstrator to Rural Schools, on "School Fairs, and How the Clubs may help".

ONTARIO POULTRYMEN'S CONVENTION

A convention of representatives from forty Ontario local poultry associations was held at the Ontario Agricultural College, Guelph, Ontario, on June 13th and 14th, 1917. This convention was brought about through the joint efforts of the Confederation of Poultry Associations and the Live Stock Branch of the Ontario Department of Agriculture. An important feature of the convention programme was the setting of dates for the various poultry exhibitions and the appointment of judges to act at the same. Among the subjects receiving special attention were those of "Grain Shortage for Feed", and "The Feeding of Buckwheat Screenings". In the discussion of these subjects Prof. W. R. Graham of the O.A.C., Mr. Geo. Robertson of the Central Experimental Farm, Ottawa, and Mr. H. P. Donovan of Toronto, took prominent parts.

ALBERTA HORSE BREEDERS' ASSOCIATION

In order to encourage horse-breeding in the province, the Alberta Horse Breeders' Association has decided to hold a sale of horses under three years of age bred in Alberta during the holding of the Winter Fair which commences at Edmonton on December 11th. The sale will be open to both pure-bred and grade horses, but foals under one year must have been registered.

BETTER WATER CONFERENCE

A more and better water conference was held at Lethbridge, Alta., under the auspices of the local Board of Trade, on June 22nd. Addresses were delivered by Mr. A. V. White, Engineer of the Commission of Conservation, Ottawa, by D. B. Dowling, Dominion Geologist, by Dean Howes, of the Provincial College of Agriculture, by F. C. Nunnick, Agriculturist of the Commission of Conservation, and by

Provincial Government officials. At the close a series of resolutions were passed in accordance with the spirit of the conference, urging co-operation between the Dominion and Provincial Governments in the work desired and stating that in the opinion of the conference there should be established at the University of Alberta a department of agricultural engineering to give the B.S.A. graduates and others interested a course in this work, and to undertake such research work as should be of service to the farmers of Alberta in matters pertaining to road making, irrigation and drainage.

BRITISH COLUMBIA DAIRYMEN'S ASSOCIATION'S EXTRA CONVENTION

At the annual convention of the British Columbia Dairymen's Association held in the city of Nanaimo, Vancouver Island, last January, members from the Okanagan Valley urged upon the association to hold the next annual convention at Kelowna. It was felt, however, that the annual meeting, which has always been held at different points on the Island and Lower Mainland, should remain in the older dairy districts, and a promise was given that if possible an extra convention would be arranged for the up-country districts, to take place some time during the summer. Accordingly, arrangements were completed for a two days' convention to be held in Kelowna on June 22nd and 23rd.

On the first day, the morning session consisted of demonstrations in placing and judging dairy cattle and horses by Prof. J. A. McLean, of the British Columbia University, and Prof. W. T. McDonald, Provincial Live Stock Commissioner. In the afternoon, after a picnic lunch served by the ladies of the community, the session opened with an address of welcome from the local member of the Legislature, who told of the rapid development of dairying in the district and of the great increase in the number of silos. Two years ago the only silo in the district was a demonstration one built by the provincial Department of Agriculture; now there are 30 of such structures. Prof McLean gave a talk on "Feeding Dairy Cattle;" Mr. T. A. F. Wiancko, Provincial Dairy Instructor, spoke on the "Causes of Variations in Cream Tests," and Prof. L. Stevenson, Superintendent of the Dominion Experimental Farm at Sidney, Vancouver Island, in an address on "Corn and Its Relation to the Dairy Industry," emphasized the importance of proper cultivation and seed selection for maximum production. The session closed with an interesting talk on hogs, led by G. S. Harris, Moresby Isle.

The evening session was held in the school-house at Rutland, about six miles from Kelowna, where the farmers are becoming very enthusiastic dairymen, and on their small holdings are going in for intensive methods. Dr. S. F. Tolmie, British Columbia Representative of the Dominion Live Stock Branch, opened the programme with a talk on "Contagious Abortion, Milk Fever, and Bloating." P. H. Moore, now of Alderley Farm, Royal Oak, V.I., but until recently Superintendent of the Dominion Experimental Farm at Agassiz, gave some valuable pointers on the making of clover silage. He recommended a mixture of 9 lb. red clover, 3½ lb. alsike, 1½ lb. white clover, and 2 lb. rye grass. Prof. P. A. Boving, of the University of British Columbia, followed with a talk on "The Production of Roots," emphasizing the importance of early seeding and of sufficient seed to insure a full stand. Deputy-Minister Wm. E. Scott, of the Department of Agriculture, urged upon those present the importance of increased production.

Concurrently with the Rutland meeting, Prof. W. T. McDonald, Provincial Live Stock Commissioner, adressed the boys' and girls' club at the Board of Trade Rooms, Kelowna.

On the second day the programme opened in the morning with a field-root demonstration at the Bankhead Ranch—one of the largest of the fruit ranches where dairying is carried on as a paying side-line. A dozen or more motor cars took the visitors and speakers through the Glenmore Valley, a distance of about 10 miles to Ellison, where at the farm of Mr. Heroron a further talk on alfalfa and corn was given by Prof. Stevenson.

After lunch, again served by the ladies of the community, Mr. J. W. Berry, of Langley Prairie, and Mr. E. Dodsley Barrow, Member for Chilliwack in the provincial Legislature, spoke on "Co-operation," urging farmers to study particularly the marketing end of their profession.

A motor trip through twelve to fifteen miles of the finest orchards and farm lands of the Okanagan Valley, brought the convention to a close.

CANADIAN RECORD ASSOCIATIONS AND REGISTRATIONS

The following table shows the relative standing of the Canadian Live Stock Record Associations as regards date of incorporation, and membership and number of pedigrees recorded in Canada. It does not refer to previous records, a number of which for several breeds were established at much earlier dates:

BREED ASSOCIATION	Incorporated Federal Act	Number of Members up to January 1st 1917	Number of Pedigrees Recorded up to June 1st, 1917
CATTLE			
Canadian Aberdeen Angus Association	1906	304	12,768
Canadian Ayrshire Breeders' Association	1905	1,365	61,460
Canadian Brown Swiss Association	1914	8	696
Canadian Guernsey Breeders' Association	1905	65	1,384
Canadian Hereford Breeders' Association	1905	403	29,050
Canadian Jersey Cattle Club	1905	385	8,654
Canadian Red Polled Association	1906	47	2,892
Dominion Shorthorn Breeders' Association	1901	2,542	243,380
French-Canadian Cattle Breeders' Association	1905	172	4,215
Holstein-Friesian Association of Canada	1900	2,175	81,794
North American Galloway Association	1905	28	2,214
HORSES			
Canadian Belgian Draft Horse Breeders' Association	1907	80	1,010
Canadian French Coach Horse Breeders' Association	1910	12	113
Canadian Hackney Horse Society	1905	182	2,078
Canadian Percheron Horse Breeders' Association	1907	381	11,298
Canadian Pony Society	1908	61	....
(*a*) Exmoor	....	....	....
(*b*) New Forest	....	....	....
(*c*) Polo and Riding	....	....	1
(*d*) Shetland	....	....	900
(*e*) Welsh	....	....	146
Canadian Shire Horse Association	1905	99	2,447
Canadian Standard Bred Horse Society	1910	226	2,387
Canadian Suffolk Horse Society	1910	20	390
Canadian Thoroughbred Horse Society	1906	156	2,108
Clydesdale Horse Association of Canada	1905	2,463	58,536
French Canadian Horse Breeders' Association	1905	172	1,674
DOGS			
Canadian Kennel Club	1915	876	18,525
SHEEP			
Canadian Sheep Breeders' Association	1905	761	....
(*a*) Cheviot	....	....	1,447
(*b*) Cotswold	....	....	2,730
(*c*) Dorset	....	....	1,383
(*d*) Hampshire	....	....	1,461
(*e*) Leicester	....	....	10,830
(*f*) Lincoln	....	....	897
(*g*) Oxford	....	....	6,790
(*h*) Shropshire	....	....	16,975
(*i*) Southdown	....	....	1,185
(*j*) Suffolk	....	....	2,738
(*k*) Romney	....	....	41
SWINE			
Canadian Swine Breeders' Association	1905	1,176	....
(*a*) Berkshire	....	....	45,286
(*b*) Chester White	....	....	15,191
(*c*) Duroc Jersey	....	....	7,787
(*d*) Essex	....	....	....
(*e*) Hampshire	....	....	1,435
(*f*) Poland China	....	....	5,745
(*g*) Tamworth	....	....	11,298
(*h*) Yorkshire	....	....	55,391

NEW PUBLICATIONS

THE DOMINION DEPARTMENT OF AGRICULTURE

THE DOMINION EXPERIMENTAL FARMS

THE DIVISION OF CHEMISTRY

The Manuring of Market Garden Crops, with special reference to the use of fertilizers; by Frank T. Shutt, M.A., D.Sc., Dominion Chemist, and B. Leslie Emslie, C.D.A., F.C.S., Supervisor, Investigational Work with Fertilizers; Bulletin No. 32, second series; 36 pages. "A useful bulletin at the present time and for many years to come," says the Director of the Dominion Experimental Farms. It is one that should commend itself to every cultivator of the soil, both amateur and professional, for briefly, concisely and in plain language complete information is given as to the use, composition and value of various forms of fertilizers and the requirements of special crops.

THE POULTRY DIVISION

Poultry-Keeping in Town and Country, by F. C. Elford, Dominion Poultry Husbandman, Bulletin No. 89. As the letter of submission suggests, the publication of this 48-page bulletin at a period when both amateur and professional poultrymen are being urged to exert themselves to the utmost to increase and better production is especially timely. It runs the entire gamut of poultry keeping, housing and breeding and contains close upon 70 appropriate illustrations.

THE DAIRY AND COLD STORAGE BRANCH

The Manufacture of Cottage and Buttermilk Cheese is the title of Circular No. 22 issued from the office of the Dairy Commissioner. It treats in two sections of "Coagulation of the milk by Souring" and "Coagulation of the Milk by Rennet" and in a third section of the manufacture of cheese from buttermilk.

Small Cold Storages and Dairy Buildings, by J. A. Ruddick, Dairy and Cold Storage Commissioner, and Jos. Burgess, Cold Storage Inspector, is Bulletin No. 49 of the Dairy and Cold Storage series. This bulletin replaces Bulletin No. 35 (now out of print). Bulletin 49, recently published contains plans, specifications and building directions for small cold storages, and farm dairies, in connection with icehouses and refrigerators.

THE HEALTH OF ANIMALS BRANCH

Evaporated Apples, by C. S. McGillivray, Chief Travelling Inspector, Fruit and Vegetable Canneries, Bulletin No. 24. With many drawings of implements and structures that can be used in the process, this 38-page bulletin describes very fully the method, manner and value of evaporation. It tells of the different types of evaporators, their necessary equipment, of methods of grading, curing, storing and packing, the quantity of moisture that should be retained, of mistakes in manufacturing, the commercial importance and worth as a food.

THE FRUIT BRANCH

Modern Methods of Packing Apples; Bulletin No. 2, Fruit Commissioner's Series; 62 pages. Not only does this bulletin explain in detail, with numerous illustrations, the best methods of packing apples, but it describes with exactness how the boxes and barrels that are used should be made; how the packers should be marked, how the fruit should be graded and the utilization of the packing bench and packing table. Intended for beginners, the bulletin is a treatise from which every packer and shipper will gain some worth-having information.

THE PUBLICATIONS BRANCH

Publications Available for Distribution. A new catalogue of publications issued by the Department of Agriculture and to be had on application to the Publications Branch shows a list of 11 annual reports and 5 special reports, and, of bulletins, pamphlets and circulars, 31 relating to dairy, 64 to field crops, 37 to insects and plant diseases, 51 to live stock, 43 to the orchard and garden, 33 to poultry, and 42 to miscellaneous subjects.

THE PROVINCIAL DEPARTMENTS OF AGRICULTURE

QUEBEC

Treatment of Potatoes and Seed Wheat, by Georges Maheux, B.A., F.E., Entomological Inspector, is Bulletin No. 41 and deals with the diseases affecting potatoes and seed wheat and gives complete directions for the formalin treatment for the control of the diseases affecting the two plants.

How to Plant Your Fruit Trees, by J. H. Lavoie, F.E., Chief of the Horticultural Service, constitutes Bulletin No. 40. In this bulletin complete directions are given for caring for the young trees when first received and for the successful planting of the same. It concludes with a list of the different varieties of fruit trees and shrubs, particularly recommended for the province of Quebec.

Celery Culture, by J. H. Lavoie, Chief of the Horticultural Service, is Bulletin No. 39. In the preparation of this bulletin Mr. Lavoie was assisted by Messrs. Hamel, Couton and Petraz, horticultural inspectors. This bulletin deals with the celery plant under the headings of species and use, rotation, sowing, soil, plantation, cultivation, blanching, packing, diseases and insects affecting the plant.

The Enemies of our Orchards and Vegetable Gardens and How to Fight Them, by Georges Maheux, B.A., F.E., Entomological Inspector, is Bulletin No. 37 of the Horticultural Service of the Quebec Department of Agriculture. In this bulletin there are contained a list of insects and diseases harmful to fruit trees and notes regarding the best preventives and remedies for the same.

Annual Report of the General Stock Breeders' Association of the Province of Quebec. This publication is a full account of the proceedings of the association's twenty-third annual meeting held in February, 1917, at Montreal, as well as a complete statement of the operations of the association for the year ending 31st December, 1916.

The Production of Capons for the Market, by the Manager of the Poultry Department of the Oka Agricultural Institute. This is a fifteen-page circular describing with illustrations the operation of caponizing, the instruments that should be used and how they should be used. It also tells how capons are to be fed and shows that they are more profitable than roasters or broilers.

Bulletin No. 45 consists of a list of The Circles of Agriculture, Horticultural Societies, Co-operative Societies, and Horse Breeders' Syndicates in the province of Quebec with their presidents and secretaries.

ONTARIO.

The Report of the Minister of Agriculture for the year ending October 31, 1916, makes a blue book of 84 pages. It reviews the work of all the branches and is thus a chronicle of the activities carried on during the last year of the late Minister, the Honourable J. S. Duff, who died on November 17th, and a portrait of whom forms the frontispiece. Comprehensive attention is specially paid to the work of farmers' clubs, women's institutes, boys' and girls' competitions and school fairs. Numerous illustrations add to the interest of the report.

The Pear in Ontario is the title of Bulletin 249 of the Provincial Fruit Branch, written by F. M. Clement, B.S.A., formerly director of the horticultural experiment station, Vineland, and O. J. Robb, B.S.A. It is an appropriately illustrated bulletin of 28 pages that deals very thoroughly with the cultivation of the pear, contains a chapter on marketing and concludes with a brief treatise on the diseases to which the pear is subject

Farm Poultry with the Results of Some Experiments in Poultry Houses and Fattening Chickens; by W. R. Graham, B.S.A., Professor of Poultry Husbandry and F. N. Marcellus, B.S A., Lecturer in Poultry Husbandry at the Ontario Agricultural College, now Bulletin 247, is a revised edition of Bulletin 217. It contains eighty pages with illustrations, diagrams and drawings. It deals with selection and breeding, egg production, housing, feeding, disease, candling, dressing, marketing and so forth.

Ontario Fish and How to Cook Them. This pamphlet of eight pages, issued by the Organization of Resources Committee of the province of Ontario, describes how to cook in various ways, nine varieties of food fishes of the province.

Crop bulletin number 131, being for the month of May, contains a report upon the weather, condition of the crops, live stock, fodder supply and the farm labour of the province, together with remarks of correspondents.

MANITOBA.

Manitoba Agricultural College Calendar, 1917-18, in addition to announcing and describing the regular courses of study in agriculture and home economics which open on October 16, 1917, and close on April 6, 1918, includes the announcements of ten short courses to be held during the year, the exact dates for which will be announced later.

The Annual Report of the Manitoba Agricultural College for the year ending November 30th, 1916, makes a publication of 114 pages with illustrations. Complete reviews of all the activities of the college are given, with a comprehensive introduction by the President, and lists of members of the staff, graduates, undergraduates and employees of the college who have enlisted.

Crop Report, No. 95, published by the Provincial Department of Agriculture, briefly chronicles the conditions in the province for the first six months of the year. Statistics covering 15 years are also given of the number of live stock.

The Ploughing Match, Circular No. 43 of The Extension Service, Manitoba Agricultural College, is divided into two parts: Part I, "Organizing for the Ploughing Match," is written by T. J. Harrison, B.S.A., Professor of Field Husbandry, Manitoba Agricultural College. This part deals with the evolution of the plough, ancient and modern types of ploughs, the object of ploughing, and includes many hints with regard to the organization of a ploughing match. Part 2, "Field Work of the Ploughing Match," is by F. F. Parkinson, B.S.A., of the Extension Service. This part gives hints with regard to the selection of the field and general directions for a ploughing match. The adjustment of the plough and attachments are fully dealt with, as are the methods of operating in order to get the best results.

Summer-Fallow Competitions in Manitoba, by T. J. Harrison, B.S.A., Professor of Field Husbandry, Manitoba Agricultural College, and S. A. Bedford, Chairman, Manitoba Weeds Commission, is Circular No. 42 of the Manitoba Department of Agriculture. Summer-fallow competitions are now recognized as an important part of agricultural society work in Manitoba. To encourage better methods, the Department of Agriculture gives to agricultural societies engaging in this line of work a special grant of sixty per cent of the amount of money actually paid out in cash prizes. In order that competitions may be conducted throughout the province on a uniform basis, this illustrated circular which describes the objects and needs of fallowing, outlines the conditions under which the competitions are held and prints the score cards to be used in the different districts into which the province is divided.

Crop Bulletin No. 1.—Grain Crops and Live Stock, June, 1917, issued by the Statistics Branch, Department of Agriculture reports that crops propects in the southern, central and northern districts are favourable, that live stock wintered well and that there is a general tendency among the farmers to act on the advice and counsel of the Department to obtain more and better live stock. The preliminary estimated crop area for the province is 4,245,000 acres, an increase over the final crop area for 1916 of 419,584 acres. Increased acreages are sown to oats, flax, speltz and green-feed, while decreases are noted in the sowings of spring and fall wheat, barley and rye.

MISCELLANEOUS

The Annual Report of the Pomological and Fruit Growing Society of the Province of Quebec for 1916 is a one hundred and forty page book giving in minute detail the proceedings of the annual summer meeting of the Society held at La Trappe, Que., on September 6th and 7th, 1916. In addition to the report of the summer meeting, the proceedings followed out during the year are reported.

The Eleventh Announcement of Macdonald College, Ste. Anne de Bellevue, Que., being for the college year 1917-18, announces the regular courses in Agriculture and Domestic Science and describes in detail the subjects covered in each of the respective years of the college course. The regulations and course of study followed in the School for Teachers, in so far as they relate to the province of Quebec, are also given in detail. The concluding pages are devoted to a statement of the assistance offered by Macdonald College to the farming community of the province of Quebec.

Home Labour-Saving Devices, by Rhea C. Scott, District Agent for Home Demonstration in Virginia; 119 pages; crown 800; J. B. Lippincott Company, Publishers, Philadelphia. Published with the authority of the United States Government, here is a book containing information of value to every boy and girl and to many men and every woman. It tells how to make practically every kitchen convenience and many other articles that add to the comfort of a home at home and at small cost. Here is a list of the headings to chapters which at once conveys an impression of the little book's contents: Kitchen conveniences, dining room conveniences, porch equipment, miscellaneous equipment, poultry devices, dairy devices, fundamentals in wood-working.

NOTES

The British Columbia Department of Agriculture has authorized the purchase of a limited number of stumping machines to be supplied to Farmers' Institutes on the deferred payment system. This action on the part of the Department of Agriculture is the outcome of a number of requests which had been received by the Department from Farmers' Institutes. The terms of payment for the machines are one-third on delivery, one third in one year and the remaining third in two years.

In addition to the summer courses for teachers annually held in Ontario, a short course of four weeks, at least, in Farm Mechanics will this year be given to teachers who are qualified to teach agriculture in the high schools. In 1916, one hundred and fifty-three teachers attended the summer courses leading to an elementary certificate in agriculture and horticulture and forty-three attended the courses leading to the intermediate certificate.

The dairy industry in Manitoba is improving rapidly, both in quantity and quality of output. The value of marketed dairy products in 1916 was $4,482,288, as compared with $3,845,183 in 1915. If the output should continue to increase at the same rate, it will amount to eight millions and a half in 1920.

The yield of grain grown in Manitoba by sowing uncleaned No. 3 Northern seed was 24 bushels per acre, and the grade No. 4; from same seed put once through the fanning mill, 29 bushels, 20 pounds, grade No. 3; from seed put three times through the mill, 30 bushels, grade No 3. Query: Does it pay the farmer to clean the grain more than once?

A handsome shield valued at $50 was offered by Hon. Mr. Motherwell, Minister of Agriculture for Saskatchewan, to the winner of the highest average score in the competition of the creamery classes at the provincial exhibition held at Regina, July 23rd to July 27th, 1917. The shield has to be won twice in order to become the absolute property of the successful competitor.

A Farmers' Automobile Tour arranged by J. N. Allan, B.S.A., and E. K. Hampson, B.S.A., District Representatives for Wentworth and Welland Counties, respectively, was taken by 82 farmers in 17 automobiles. During the tour stops were made at Vineland Experimental Station, at Larkin Farms at Queenston, Ont., the Cavanaugh Stock Farm near Buffalo, and at the farm of Mr. F. W. Houck at Black Creek, Ont.

Arrangements have been made by the Minister of Agriculture for BritishColumbia with the Canadian Pacific Railway Company for the transportation of labour for the harvesting of the fruit crops. A fare and a third round trip rate has been secured to those presenting certificates signed by certain officials of the Department of Agriculture. It is expected that from 1,500 to 2,000 pickers will be required, apart from those regularly employed in the fruit growing districts.

W. J. Bonavia, Secretary of the British Columbia Fall Fairs Association, has announced the dates of agricultural fairs which have been arranged by the Department. The province is divided into six circuits and fairs will be held throughout these circuits beginning July 2nd and ending late in October.

The competition is confined to boys and girls between the ages of ten and fifteen years. Each competitor is required to feed, care for and fit the exhibit for at least three months immediately previous to the opening of the fair. Only one entry may be made by any one competitor. The Saskatchewan Swine Breeders' Association will pay the transportation charges on individual exhibits to the place where the exhibition will be held. In each competition fifteen prizes will be awarded, reaching from four dollars to thirty dollars.

At a meeting of the executive of the Saskatchewan Swine Breeders' Association, held recently in Regina, it was decided by the directors that some of the funds of their association could be spent to no better purpose than to stimulate interest in the swine breeding industry, by interesting the young people. With this end in view the sum of $400 was set aside to be spent in prizes for a boys' and girls' pig-feeding competition to be held in connection with the Provincial Winter Fairs at Regina and Saskatoon next fall: $200 each to be offered in fifteen prizes at the respective fairs.

It is estimated that this year 75,000 "additional" acres are under vegetable cultivation in New York City. Formerly real estate agents insisted that home buyers should plant nothing but flowers, shrubs or trees. This year the agents have not only relaxed that condition but they have given up every foot of vacant land to vegetable cultivation. In some cases they themselves had the land prepared for sowing and planting and in others anybody willing to till them could take the vacant lots, practically for nothing or for a small percentage of the production. Several committees had the work of management in hand, one being known as the Food Supply Committee and another as the committee on Food Gardens. These committees obtained a hundred car-loads or 90,000 bushels of seed potatoes from Maine for distribution. They also supplied other varieties of seed. Before the Food Gardens committee was formed there were twenty organizations doing the work they are now doing. The Park Commissioners of Manhattan, Brooklyn and the Bronx are at the head of the movement in each of their districts. In the first week of its work the committee apportioned out from previously waste and meadow land 1200 plots of an average size of a quarter of an acre. Even the golf clubs around the city have gone in for production by ploughing up portions of their links. Well-to-do people generally have shown a disposition to help, either by surrendering land, subscribing money or loaning implements.

In 1916, 358 regular students were in attendance at the Manitoba Agricultural College, and 365 at short courses from two weeks to three months. The effect of the college on agriculture and country life is multiplied many-fold by the teaching these short course students are handing on.

Mr. J. H McCulloch, District Agriculturist with headquarters at Kamloops, B.C., has resigned from the service of the Provincial Government to take a position in Winnipeg. Mr. McCulloch made his headquarters at Quesnell for several months but recently his district was enlarged and his headquarters transferred to Kamloops. Mr. Geo. C. Hay, who has been stationed at Telkwa, B.C., for the past year and a half as District Agriculturist, has been transferred to Kamloops and will fill the position vacated by Mr. McCulloch.

School Ground Improvement, which was inaugurated in 1914 in British Columbia, made during last year considerable progress. In the neighbourhood of sixty school grounds have already been included under the scheme of improvement of the Department of Education. Mr. J. W. Gibson, Director of Elementary Agricultural Education for the province, gives his personal attention to the planning of these grounds and liberal assistance is further given by way of special grants from the Department. These grants are conditional upon equal amounts being spent by the school boards themselves.

In Vol. I of THE AGRICULTURAL GAZETTE pages 954 to 960, is given a full history of the United States potato embargo of December 22nd, 1913, and its subsequent modification under rigid restrictions. By an order dated June 4th 1917, the United States Government has further amended the embargo order "so as to permit, free of any restrictions whatsoever under the plant quarantine Act of August 20, 1912, the importation of potatoes from the Dominion of Canada and Bermuda into the United States or any of its territories or districts on and after July 1st, 1917."

Strenuous efforts are being made to eradicate tuberculosis from the state of Maine. Acting with the Bureau of Animal Industry of the United States the state has been divided into districts and inspectors appointed to apply the tuberculin test free to all cattle. Especial care is to be taken to have horses and cattle entering the state thoroughly examined.

Mr. R. M. Winslow, B.S.A., Provincial Horticulturist and Inspector of Fruit Pests for British Columbia has resigned his position to become connected with the Mutual Brokerage Company with headquarters at Vancouver. The position vacated by Mr. Winslow has been temporarily filled by the appointment of Mr. M. S. Middleton, B.S.A., who has acted in the capacity of Assistant Horticulturist in British Columbia for the past nine years.

In addition to their duties as agricultural instructors in regular and extension high school classes, the District Supervisor of the British Columbia Department of Education had last year immediate supervision of the rural science work of the public schools tributary to those high schools where agriculture is being taught. This has resulted in very much better work along the line of nature study and school gardening in these public schools, to which the District Supervisors make regular visits. Agricultural classes with regular students were held in the high schools at Chilliwack, Vernon, Armstrong, Murrayville and Cloverdale under the supervision of the District Supervisors. Owing to the fact that the majority of the young men in these districts have gone overseas, these classes were thrown open to men generally, with the result that some of those who attended were men of middle age. The enrolment at these schools was as follows:—

Chilliwack, Advanced Class	9
Junior Class	18
Cloverdale, Junior Class	14
Murrayville, "	27
Armstrong, "	18
Vernon, "	34
Total	120

INDEX TO PERIODICAL LITERATURE

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The Grade and the Loaf—The Baking Quality of the Flour from the Various Grades of Western Spring Wheat, Prof. R. Harcourt, page 1035.

July 4—Getting Ready for the 1918 Crop, Seager Wheeler, page 1107.

Making War on Insects—A Cheaper Poison than Paris Green—Biting and Sucking Insects, J. A. Neilson, B.S.A., Lecturer in Horticulture, Manitoba Agricultural College, page 1115.

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Raising Dairy Calves of Prime Importance, W. J. Reid, B.S.A., Director of Agricultural Instruction, Prince Edward Island, page 5.

July 6—Rendering Hogs Immune to Hog Cholera–Authoritative Statement on Value of Double Treatment, Dr. F. Torrance, Veterinary Director-General, page 2.

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Apple Growers met disaster with number 3 Grade, D. Johnson, p. 808.

July 7—Bred-To-Lay Poultry Returns a Universal Profit, M. A. Jull, page 868. An Efficient Water System for Every Farm Home—Some Expert Advice about Installing Water System—Pneumatic or Compressed Air Systems Explained, Thos. Stansfield, page 869.

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June 27—Rural Denmark and Co-operation, S. P. Brophy, University of Saskatchewan, Saskatoon, page 931. Agriculture in Schools, page 937.

July 4—Farm Management and the War—The Business of Farming, J. B. Reynolds, President, Manitoba Agricultural College, page 972.

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July 5—Care of Late Hatched Chicks, T. A. Benson, Edmonton, Dominion Poultry Representative for Alberta, 633.

The Canadian Thresherman and Farmer, Winnipeg, Man., June, 1917.

Better Farm Homes, Prof. L. J. Smith, Department of Agricultural Engineering, Manitoba Agricultural College, page 46.

PART V

The International Institute of Agriculture

T. K. Doherty, LL.B., Commissioner

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section of THE GAZETTE should be addressed to T. K. Doherty, Institute Commissioner, Department of Agriculture, Ottawa.

Unless application through the Canadian Commissioner is preferred, the original Institute Bulletins may be obtained direct from the General Secretary of the International Institute of Agriculture, Rome, Italy. The subscription rates postpaid are as follows:

	Per annum.
International Review of Agricultural Economics	18 francs
International Review of the Science and Practice of Agriculture	18 "
International Crop Report and Agricultural Statistics	6 "
The Three Bulletins together	36 "

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION.

1253—Agriculture and Agricultural Industries in Roumania,—XENOPOL, NICOLAS, in *Le Mouvement Economique*, Year 12, Vol. XXIII, No. 136, pp. 125-154; No. 138, pp. 191-209. Bucharest, April 1st and June 1st, 1916. (4 pp in Institute Bulletin).

From the agricultural point of view Roumania is particularly adapted to the production of cereals. After the opening of the Black Sea to the ships of Roumania by the Treaty of Adrianople in 1829 the cattle raising industry was to a large extent superseded by the production of cereals. Previously the chief articles of commerce were cattle, wool, wax, wine, salt, hides and salt fish.

At present wheat is the most important cereal raised, occupying almost five million acres. The yield has varied during the past twelve years from 18 to 30 bushels per acre, and this could be easily increased with better methods of cultivation, irrigation and the use of chemical manures. The export of wheat, the value of which ranged from $41,000,000 to $51,000,000 from 1911 to 1913, represents almost half of the total export of cereals. Of the eight million inhabitants of the country, about three fourths seldom eat wheat bread but use corn instead.

The value of the crops of Roumania in 1914 amounted to $251,000,000 of which $200,000,000 were for cereals, $13,500,000 for potatoes and other vegetables, $18,000,000 for fodder plants, and $2,600,000 for textile and industrial plants.

About half the rural territory is in the hands of small holders and the large estates take up 40 per cent, the remainder being in large farms. The peasants cultivate not only their own holdings but also a large part of the estates either on shares or as tenants. For this reason the large estates generally lack capital for development or necessary buildings. Aliens possess very little land in Roumania, it having been enacted by a law in 1879 that only Roumanians or naturalized citizens may acquire rural property in that country. The rights acquired before the date of the law were, however, respected.

It is important that the management of waters and forests should be regulated. It will also be necessary in the interests of agriculture to improve the means of transport and increase the railroad mileage. Another important question is that of storing cereals. The building of docks at Braila and Galatz has solved the problem for part of the cereals destined for exportation, but for the rest of the country it is absolutely necessary to construct at the principal stations, warehouses where cereals may be sorted and classified.

The author gives an account of the milling industry in which over $8,000,000 is invested. The export of flour represents 7 per cent of that of wheat. There are thirteen establishments for the manufacture of wool fabrics. Wools of a finer quality are imported and the importation of woollen fabrics is considerable as the production is far from supplying the demand. The manufacture of woollen fabrics, at least those of an inferior quality, could be greatly increased if the farmers had not given up live-stock raising for the cultivation of cereals. The number of sheep has lately been diminishing and very little is done to improve the native breeds.

The state owns 2,600,000 acres of forests, and 3,950,000 acres are privately owned the total forest area being 20 per cent of that of the country. The forest industry is in the hands of fourteen powerful associations of very large capital. A large proportion of the timber produced is exported, the value of the exports in 1913 being $4,700,000.

The paper and pulp industry is quite important in Roumania, there being over $5,000,000 capital invested in it. The home consumption of paper and pasteboard amounted to 40,000,000 lb. valued at over $2,000,000 in 1914. Roumania does not export any paper. On the contrary in 1913 she imported 3,619 tons of pulp.

1255—**Agricultural Instruction by Correspondence in France.**—LINDET, in *Comptes Rendus de l'Academie d'Agriculture de France*, Vol. II, No. 32, pp 931-933, October 19th, 1916.

In October 1913, the Union of Agricultural Syndicates initiated a system of agricultural instruction by correspondence. During the period from October to April a monthly bulletin is sent to the students, each containing the material to be studied in the following four weeks. The pupils may be assisted by his parents, or better, by a farmer or other person appointed by the Union. The programme of the course is as follows:

(1) Different subjects are indicated to the pupils to be studied in books furnished by the Union or to be found in the library of their local syndicates. (2) Instructions are given the students for the establishment of experimental plots where they may gain experience in the use of fertilizers, etc. (3) Simple experiments are suggested relative to: the depth at which different seeds may be sown—the germinative power of seeds—relation of the density of potatoes to their starch content—coagulation of clay by lime—action of nitrate of soda on the stooling of the plant and the production of straw—whitewashing, etc. 4. The students are taken by the local instructor to examine the crops, animals and implements on neighbouring farms. 5. The students are instructed to study from books available the nature of the soil in their district, the industrial plants cultivated there and the uses to which they are put, the preparation of seed, planting of fruit trees, etc. 6. They are taught how to solve such agricultural problems as: the value of a certain volume of wheat when the density of the wheat and the price per bushel is known. The value of a certain quantity of manure of which the composition and the prices of the various fertilizing elements are known. The price of the ration: of a horse in relation to his weight, of a fatting calf, etc.

The students send to the Union each month an account of the information they have acquired and of their experiments and excursions, and solutions for the problems set before them. The statements are corrected and returned to the students. The monthly bulletin publishes the names of the students who have done the best work.

CROPS AND CULTIVATION

1260—**The Overhead Electric Discharge and Crop Production.**—BLACKMAN, V. H. and JORGENSEN, I., in Journal of the Board of Agriculture, Vol. XXIV., No. 1, pp. 45-49. London. April, 1917.

Description and Treatment of Selected Area.—The experiments upon the effect of the overhead electric discharge upon crop production were continued during 1916 at Lincluden Mains Farms, Dumfries. These experiments, as in previous years, owe much to the careful way in which they were carried out by Miss E. C. Dudgeon. As in 1915, oats were chosen for the experimental crop. A large field of nine acres which in the past had given uniform crops was selected; the soil was a sandy loam The field had been in pasture without manure for the three previous years, having been grazed by cattle and occasionally by sheep.

Of this field one acre was selected as the electrified area, and two half-acres were chosen as controls. Control 1 was not far from the electrified area, but, as measurement showed, it received only a slight discharge when the wind blew from the West and Northwest. Control II lay south-east of the electrified area and so was out of the track of the prevailing westerly winds: also, it was at such a distance from the electrified area that even with northwest winds it received practically no discharge.

The difficulty of confining the discharge to the special area to be electrified is much reduced by keeping the wires low (1). The "earthed" screen of wire netting which was used in previous experiments to prevent the spread of the discharge to the control areas, was found in 1916 to be unnecessary owing to the low position of the discharge wires and the distance and position of the controls.

The overhead discharge was applied by means of a series of 21 wires running parallel to the short sides of the rectangular area (88 by 55 yards), the wires being thus about 4½ yards apart. The wires were supported at their ends at a height of 7 ft. from the ground, but, towards the close of the experiment, sagged downwards at the centre to a height of only 6 ft. The current supplied through the primary circuit was about the same as in previous years, namely, 3 amperes, at 50 volts, but owing to the lower level of the wires (7 ft. as compared with 10 ft. in 1915, and 15 ft. in 1914) and the closed arrangement of the wires (13½ ft. as compared with 15 ft. in 1915, and 20 ft. in 1914) the intensity of the discharge received by the crop was much increased (2).

Effect of Electrical Discharge on Crop.—The crop was sown on 27th March, and appeared above ground on 13th April, the discharge being started on 14th April. By 16th May there was a marked difference between the electrified and the control areas, the plants which had received the discharge being of a markedly deeper green colour and also taller. Measurements were taken at intervals of the average height of the plants on the three areas; the results are given in the following table:

	18th June	25th June	3rd July
Electrified..........	19 in.	24 in.	32 in.
Control I...........	14 in.	19 in.	21 in.
Control II...........	12 in.	18 in.	20 in.

After 3rd July it was not possible to get among the plants without damaging the crop; the measurements were therefore discontinued.

It was clear that the effect of electrification extended some little distance from the electrified area, for the height of the crop around the area was above the average and gradually decreased with increasing distance from the experimental area.

The discharge was continued until 17th August, being used only in the daytime and discontinued during actual rain The discharge was applied for 848 hours altogether during the season.

The season was very good up to the middle of August and, the electrified crop was markedly taller than the rest of the field and much heavier in grain; it was generally agreed that it was the finest crop of oats in the district. Unfortunately, heavy rain storms set in during the latter part of August and caused considerable "laying" of the heavy electrified crop, and also delay in cutting. This led to failure to garner the whole crop, owing mainly to loss of grain before harvesting. The crop was cut on 28th and 29th August, carted on 11th September, and threshed on 12th September.

The yields obtained on harvesting are given below for the electrified area and the two control areas. The grain was weighed as a whole, and the result is given in bushels of 42 lbs.; in the case of the straw every tenth "bunch" was weighed, and the weight of the whole crop calculated from the average weight of the "bunches" so obtained.

	Grain	Straw	
Electrified area...................... (1 acre)	62.8 bus. Qual. 1, 1,942 lb. (2,637 lb.) " 2, 695 "	4,924 lb. (316 bunches, av. wt. 15.6 lb.	
Control Area I...................... (½ acre)	20 bus. Qual. 1, 630 " (840 lb.) " 2, 210 "	1,218 lb. (99 bunches, av. wt. 12.3 lb.	2,619 lb.
Control Area II...................... (½ acre)	22 bus. Qual. 1, 714 " (924 lb.) " 2, 210 "	1,401 lb. (103 bunches, av. wt. 13.6lb.	

The electrified area, as compared with the control areas, gave an increased yield of 20 bushels (840 lb.) of grain (14 bushels of first quality and 6 bushels of second quality) and 2,305 lb. straw. Calculating the percentage increase over the two control areas we obtain the following result:—

Increase in grain, 49 per cent
" " straw, 88 "

After making allowance for the large experimental error inherent in agricultural experiments where the number of plots is small, it is clear that these results—taken in conjunction with those of 1915 (in which oats subjected to a weaker discharge yielded 30 per cent. increase in grain and 58 per cent increase in straw),—demonstrate that under the conditions of the experiments oats respond very markedly, by an increased yield both in grain and straw, to the action of the overhead electric discharge (3).

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(1) It has been shown by Jorgensen and Priestley (*Journal of Agricultural Science, VI, 1914*) that when the wires are fixed at a considerable height above the ground the wind may carry the discharge over a wide area.

(2) The intensity of the discharge received can be increased by (1) lowering the wires; (2) reducing the distance between the wires; (3) reducing the thickness of the wires. The wire employed was "silicium bronze" of gauge 24.

It is not possible at present to estimate accurately the financial results of the experiment. At Lincluden electric current from a power station is not obtainable, so the supply was derived from a small dynamo driven by a petrol engine. The apparatus used to produce the necessary high tension current is comparatively inefficient and not such as would be used for work on a large scale. It may be stated, however, that taking the price of produce in the district at the end of September 1916, (oats 1st quality, 91 cents per bushel; 2nd quality, 75 cents per bushel; straw, $13.38 per ton) the increased value of the crop works out at $30.00 per acre. The cost of the current used, about 130 B. of T. units, when calculated at 2 cents per unit, works out at only $2.67. The cost of an installation on a large scale cannot be predicted at present, but the profit shown above would permit of a heavy expenditure on an installation.

Residual Effect of Discharge.—A new and important aspect of the problem has been disclosed by the discovery that the application of the discharge one year may increase the size of the crop the next year, i.e., there may be a marked "after effect". The field in which the experimental crop was grown in 1915 was sown with clover and grass at the same time. The difference between the crop of clover-hay produced in 1916 on the electrified area of 1915, and that on the non-electrified area, was very obvious to the eye, and there was a marked increase in the weight of the crop obtained from the electrified area. The question of "after effect" will be investigated in future experiments. It is to be noted that this field had been well limed before the oats were sown.

If, in addition to an immediate increase of the treated crop, the electric discharge may also benefit a succeeding crop, it is obvious that the agricultural value of the application of the discharge becomes very much enhanced.

Problems still Needing Investigation.—Before, however, the use of the overhead electric discharge can be recommended to farmers, more knowledge on many points must available. The conditions under which the effect is produced—its relation to light, humidity of the air, etc.,—have to be studied. The most suitable strength of discharge has yet to be discovered; the experiments suggest that with a greater intensity of discharge still bigger yields might be obtained. The manurial conditions best suited to crop production under the discharge, and the question as to the possible effect of various types of soil, have yet to be investigated. Electrical engineering problems also arise as to the most economical methods of producing the necessary high tension current. There is also the question of the manner in which the electric discharge influences the growth of the crop—a question which is still quite unsolved.

1274—Value of Immature Potato Tubers as Seed.—HUTCHINSON, H. P., in *The Journal of the Board of Agriculture,* Vol. XXIII, No. 6, pp. 529-539. London, September 1916.

Many practical potato growers believe that tubers lifted in an immature or unripe condition give better yields than tubers of the same varieties which have been allowed to remain in the ground until their full development has been attained. The correctness of this belief has been proven by experiments made at Garforth, Yorkshire, with mid-season and late varieties in 1905 and 1906, and at Wye and Midland College in Kent from 1912 to 1916.

In the latter experiment the variety "Factor" yielded from a plot planted with mature seed at the rate of 455 bushels per acre and from immature seed at the rate of 518 bushels.

In 1915 the "King Edward" variety yielded from mature seed 231 bushels per acre and from immature seed 482 bushels.

The use of immature potatoes as seed gave more vigorous plants less susceptible to diseases and earlier and larger crops.

The superiority of immature seed may be due to the following causes:

1. *Method of selection:* In usual farming practice the tubers retained for farming purposes are of medium and smaller sizes. On the other hand by raising the plants before growth the largest tubers of the crop, being then of seed size and mostly derived from the most productive plants, are retained, with the resulting tendency to increase, or at least to maintain previous productivity.

2. *Structure of the tuber coats:* In contrast with that of mature tubers, the cortex of immature tubers is thinner, less firmly attached and capable of being more easily ruptured. This facilitates imbibition of water from without, respiration, etc., and consequently germination.

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(3) If the climatic conditions had been favourable the yield of grain would have been still greater, as explained above. Mr. Cameron, who farms the land, estimates the loss from this cause at 10 bushels; if this be accepted, the increase in grain works out at 73 per cent. On a basis of a loss of 5 bushels, only, the increase becomes 62 per cent.

3. *The amount and condition of the reserve food material:*

4. *The length of time of storage:* The length of time of storage being longer for immature tubers a larger proportion of the starch has decomposed, giving rise to a more readily available form of plant food.

1278—**Comparative Yields of Hay from Several Varieties and Strains of Alfalfa in South Dakota.**—HUME, A. H., and CHAMPLIN N., in *South Dakota State College of Agriculture and Mechanic Arts, Agricultural Experiment Station*, Bulletin No. 163, pp. 282-343. Brookings, South Dakota, January 1916.

1291—**The Fruiting of Trees in Consecutive Seasons.**—PICKERING, S., in *The Journal of Agricultural Science*, Vol VIII, Part I, pp. 131-135. Cambridge, September 1916.

Points of considerable interest, both scientific and practical, are raised by the question as to whether a tree which fruits exceptionally well as compared with its fellows in one season will tend to fruit exceptionally well, or the reverse, in the following season. There seems to be no definite reason why the behaviour of a tree as regards fruiting should alternate in consecutive years, and no such behaviour has been observed in the case of animals. Its doing so would imply that fruiting is due to the gradual accumulation of some substance in the tree, which becomes exhausted whenever heavy bearing occurs, and that the stock of this substance does not become properly replenished till after another season has elapsed.

The difficulties in obtaining exact measurements of the relative behaviour of any two or more trees in consecutive seasons are considerable. The weight of the fruit or the number of fruits may be recorded, but unless the trees are absolutely similar in size, disposition of branches, situation, etc., which is impossible, the superiority of the one over the other may be misleading. On the other hand, the trees under observation may be classified by inspection, grouping them according to the extent which they are loaded with fruit, independent of their size, and then comparing the classification in one year with that in the following year. This latter method was adopted in the case of one series of observations on trees at Harpenden, and the former in the case of the other series on trees at Richmond.

Whichever method of observation was adopted the results were treated as follows: two selected trees were numbered 1 or 2, according to which of them bore the heavier crop in consecutive seasons; then, comparing the results in two consecutive seasons, if the order of fruiting had been the same (consecutive fruiting), the difference between the numbers given to the trees would be O, if the order had been reversed (alternate fruiting) the difference would be 1; whereas if neither consecutive nor alternate fruiting prevailed, and the results were dependent solely on chance or on external conditions, the differences would, on the average, be 0.5. An average difference, for instance, of 0.75 would be half way between 1 and 0.5, indicating that the results were dependent on the alternating tendency to the extent of 50 per cent, and on chance fruiting to the extent of 50 per cent.

Results are given in Table 1:

TABLE I

PLACE	Varieties	Date	Instances	FRUITING INDICATED		
				Consecutive	Alternate	Chance
Harpenden	Several	1899-1903	332	0	44	56
Richmond	Bramley	1904-1913	1,950	12	0	88
"	Cox	1898-1909	840	16	0	84
"	Potts	1897-1904	1,266	5	0	95
"	Stirling	1897-1913	366	0	6	94
"	117 diverses	1906-1913	1,207	15	0	85

The results at Harpenden and at Richmond are therefore very different; but those at Harpenden may be discounted to a certain extent on account of the small number of cases observed.

The author also indicates the yields of several varieties of apples in Table II, the numbers giving the relative magnitude of the crops compared, in the case of Stirling Castle, with the crop in 1900 as 100, and in the other cases with that of 1911 as 100.

TABLE II.

	Stirling	Bramley	Several Varieties
1897	3	....	....
1898	30	....	....
1899	6 —	....	....
1900	100 +	....	....
1901	47 —	....	....
1902	144 +	....	....
1903	0 —	....	....
1904	148 +	35	0
1905	0 —	6 —	0 —
1906	144 +	7 +	12 +
1907	38 —	20 +	20 +
1908	95 +	7 —	15 —
1909	171 +	103 +	34 +
1910	264 +	9 —	13 —
1911	78 —	100 +	100 +
1912	47 —	0 —	10 —
1913	207 +	103 +	114 +
1914	0 —	0 —	0 —
1915	549 +	159 +	114 +

A plus or minus sign has been placed after the values showing whether they are above or below the means of the preceding and succeeding seasons, and the extent to which these signs indicate, although not without some irregularities, is very remarkable; and this alternation may now be extended by another season, for the crops this year are far below the average. In the case of Cox and Potts no such alternations were recognizable, but, of course, owing to differences in the dates of blossoming, and the hardiness of the flower buds, all varieties would not be affected to a like extent by frost in any given season.

LIVE STOCK AND BREEDING

1295—Chalcis Calliphorae N. Sp., and Nasonia Brevicornis, attacking the Larvae of Sheep Maggot Flies.—FROGGATT, W. W., in *Queensland Agricultural Journal*, Vol. VI., Part 3, pp. 177-179. Brisbane, September 1916.

Description and illustration of a new parasite of the maggots of the blow-fly, *Calliphora oceaniae* discovered by M. T. MacCarthy who has given it the name of *Chalcis calliphorae*. It is a little black wasp about the size of the domestic fly, which lays one egg in each maggot before it searches cover. This wasp is hardy, easy to handle and breed, and able to stand a long journey by post in a packet.

Nasonia brevicornis is another parasite of *Calliphora oceaniae* previously discovered. It develops more rapidly than *Chalcis calliphorae* and is more prolific. It is equally hardy and easy to breed.

1301—Fish Meal as a Food for Pigs.—CROWTHER, C., in *The Journal of the Board of Agriculture*, Vol. XXIV, No. 1, pp. 27-33. London, April 1916 (4 pages in Institute Bulletin).

Experiments carried out at Manor Farm, Garforth (experimental farm of the University of Leeds and the Yorkshire Council for Agricultural Education).

Twelve large white pigs, ranging in age from 13 to 21 weeks, were divided into two lots as evenly as possible, each lot consisting of 3 castrated hogs and 3 gilts. In making up the lots attention was paid not only to age and live-weight but also to breeding, to ensure that each litter drawn from should be represented as uniformly as possible in each experimental group.

The animals were weighed weekly throught the experiment, and at each weighing not only was the total weight of each lot ascertained, but the weight of each individual was taken as accurately as the weigh-bridge would permit (½ lb.), so that a rough guide as to the rate of progress of each animal was obtained.

No milk, whey or dairy refuse was fed at any stage of the experiment.

It will be observed that the experiment consisted of a comparison of equal weights of sharps and fish-meal, the latter forming from one-seventh to one-ninth of the total allowance of dry food, and rising in the last month of the experiment to rather more than one lb. per pig daily. The general plan of the experiment is summarized in the following table:

PERIOD	General Character of Feeding	AVERAGE DAILY RATION PER LOT OF 6 PIGS	
		Lot A	Lot B
Preliminary Control Period (4 weeks, June 15th to July 13th).	Identical for both lots. (No Fish Meal).	2.4 lb. Bran 12.0 " Sharps 72 " Water	2.4 lb. Bran 12.0 " Sharps 72 " Water
First Transitional Period (1 week, July 14th to 20th).	Fish Meal gradually introduced into ration of Lot A, in place of equal weight of Sharps.	3.0 " Bran 13.5 " Sharps 1.5 " Fish Meal 90 " Water	3.0 " Bran 15.0 " Sharps 90 " Water
First Experimental Period (6 weeks, July 21st to Aug. 31st).	Lot A—Bran, Sharps and Fish Meal. Lot B—Bran and Sharps.	4.1 " Bran 18.1 " Sharps 2.7 " Fish Meal 107 " Water	4.1 " Bran 20.8 " Sharps 107 " Water
Second Transitional Period (1 week, Sept. 1st to 7th).	Rations of lots gradually transposed.	5.8 " Bran 27.5 " Sharps 1.4 " Fish Meal 139 " Water	5.8 " Bran 25.3 " Sharps 3.6 " Fish Meal 139 " Water
Second Experimental Period (6 weeks, Sept. 8th to Oct. 19th).	Lot A—Bran and Sharps. Lot B—Bran, Sharps and Fish Meal.	6.5 " Bran 32.5 " Sharps —— 146 " Water	6.5 " Bran 27.1 " Sharps 5.4 " Fish Meal 146 " Water
Third Transitional Period (1 week, Oct. 20th to 26th).	Fish Meal gradually introduced into ration of Lot A. Ration of Lot B unchanged.	8 " Bran 36 " Sharps 4 " Fish Meal 160 " Water	8 " Bran 33 " Sharps 7 " Fish Meal 160 " Water
Final Control Period (3 weeks, Oct. 27th to Nov. 17th.	Identical for both lots. (Fish Meal included in ration).	9.8 " Bran 42.2 " Sharps 7.0 " Fish Meal 182 " Water	9.8 " Bran 42.2 " Sharps 7.0 " Fish Meal " Water 182

The fish meal used in the experiment contained rather less than the average proportion of protein (albuminoids) and decidedly more than the average proportion of oil. This latter fact probably enhanced the feeding value of the meal, but at the same time, according to popular belief, would increase the risk of imparting a fishy taint to the carcass. The meal contained at most 2.6 per cent. of common salt, representing, in the highest allowance of fish meal used, a quantity of about ½ oz. of salt per pig daily. The supply of salt to pigs is commonly deprecated, but this amount produced no apparent ill-effects Only one of the samples analyzed contained more than this proportion, and was obviously very exceptional in this respect.

The average gains in live-weight for the different periods of the experiment are summarized below:

AVERAGE WEEKLY GAIN IN LIVE-WEIGHT PER PIG

PERIOD	Nature of Feeding	LOT A			LOT B			Average Difference in favour of Fish Meal
		Hogs lb.	Gilts lb.	Avge. lb.	Hogs lb.	Gilts lb.	Avge. lb.	
Preliminary Control Period (4 weeks).	Identical—No Fish Meal.	5.3	5.5	5.4	4.8	5.2	5.0	
First Experimental Period (6 weeks).	Lot A—Fish Meal. Lot B—No Fish Meal.	11.0	10.6	10.8	8.3	10.8	9.5	1.3
Second Experimental Period (6 weeks).	Lot A—No Fish Meal. Lot B—Fish Meal.	10.3	9.0	9.7	11.5	10.6	11.1	1.4
Final Control Period (3 weeks).	Both lots receiving Fish Meal.	15.4	12.0	13.7	12.5	11.1	11.8 (*a*)	

(*a*) This average is depressed by the abnormally low gain recorded in the last week, when two gilts being *in oestro*, not only failed to gain in weight, but caused general disturbance of the whole lot. The averages for the proceding two weeks were:—Lot A, 14.4 lb.; Lot B, 14.7 lb.

Taking the average for the whole 12 weeks covered by the two experimental periods, it will be observed that the use of fish meal, to the extent of practically one-eighth of the total ration, as a substitute for an equal weight of sharps increased the cost of feeding by barely 1 cent per pig per week. In these calculations of cost the residual manurial values of the feeding-stuffs have not been taken into account. If these be allowed on the scale suggested by Hall and Voelcker, the fish meal ration becomes actually cheaper than the ration of bran and sharps, since the manurial value of the fish meal, if of the quality used in the experiment, is $21.50 per ton of 2,240 lbs., while that of the sharps is but $7.05 per ton

Even if we leave out of account, however, these somewhat speculative estimates of manurial value and take into consideration simply the purchase prices quoted above, the fact that, on the average, an extra 1.35 lb. of live-weight was obtained weekly for 12 weeks, at the trifling cost of barely 1 cent per week, can leave no doubt as to the decided benefit which has resulted in this test from the partial replacement of sharps by fish meal.

The scale of the experiment is too small to warrant the conclusion being drawn that an equally profitable result would always be obtained, but the results, taken in conjunction with those of the Seale-Hayne experiments, do lend substantial support to the claim that fish meal is a valuable feeding-stuff for pigs.

There remained to be examined the possibility that the use of fish meal might have imparted an objectionable taint to the carcasses of the animals. In order to see if this were the case, one pig from each lot was killed and dressed on 24th November, one of the two having consumed fish meal daily for the last 11 weeks of its life, the amount exceeding 1 lb. daily for the last five weeks. In neither case could any exception be taken to the general appearance, colour or small of any portion of the carcass. Portions of the carcass were submitted further to a cooking rest with similar results. At no stage of the cooking could any exceptional smell be detected, and the flavour of the cooked meat, fat and lean, was above reproach. This is in agreement with the recorded experience of other experimenters with fish meal.

1303—**Fecundity in Hens in Relation to Stamina.**—DUNNICLIFF, A. A., in *The Agricultural Gazette of New South Wales*, Vol. XXVII, part 7, pp. 507-510. Sydney, July 1916.

The danger signal has been raised by more or less authoritative critics in various parts of the world that the striving for higher and higher egg production, and breeding from hens of great fecundity, can only result in degeneration of the constitution of the stock and consequent disaster to the breeder.

If such a danger really exists, egg-laying competitions exercise a dangerous influence by fostering and stimulating the breeder's efforts to attain high records at the expense of the vitality of the layers and the stamina of their progeny. In New South Wales, where this work has been in continuous progress longer than in any other part of the world, the attainment of high records has never been subordinated by the controlling committees to practical and utilitarian considerations, as the restrictions as to quality, size of eggs, and weight of the pullets testify.

It is instructive to trace the results of breeding from hens that have put up high records. The author cites the cases of a pen of white leghorns which won the second two years' test with 1,474 eggs in the first year and 1,150 in the second year, and another pen which won the fourth two years' test with 1,324 eggs in the first and 1,045 in the second year. Both belonged to the same owner. They proved entirely satisfactory as breeders, both as regards fertility and the constitutional vigour of the progeny. The tendency to weakness which has been pointed out as concomitant of high fecundity did not exist. The same result was shown in the cases of white leghorns, from a championship pen, the four leaders of which laid 267-270-270-288 eggs in one year. Their descendants were remarkably vigourous.

The author concludes that what is necessary in successful breeding is selection and skilled care of the flock. We should not regard as good breeding hens only those which are average layers; moreover, that "average" is very variable having been successively 150 and 180 eggs per year and 200 at the present time. There is no reason at all for rejecting hens having an annual production of 250 eggs or even more.

1304—**Distribution of Fish and Eggs of Fish made by the Bureau of Fisheries of the United States Department of Commerce during the year 1914-15.**—JOHNSON, R. S., in *Department of Commerce, Bureau of Fisheries*, Document No. 828, 138 pages. Washington, 1916, (2 pages in Institute Bulletin).

During the fiscal year 1914-15, the Bureau of Fisheries distributed about fifty different species of fresh water fish outside of fresh water shell fish (*Lampsilis ventricosa, L. Ligamentina, L. luteola, L. recta, L. anodontoides, Plagiola securis, Quadrupla pustulosa*). Other species of fish were caught in the flooded territory of the basin of theMississippi and replaced in the rivers from which they came when the floods were terminated. A table in the article in the Institute Bulletin gives the details of the distribution of each species.

FARM ENGINEERING

1308—**Steam waggon for carrying timber up to 45 feet in length.**—*The Implement and Machinery Review*, Vol. 42, No. 498, pp. 663. London, 1916.

RURAL ECONOMICS

1312—Possibility and Means of Increasing the Crop Production of the United Kingdom.—RUSSELL, E. J., in The Journal *of the Board of Agriculture*, Vol. XXIII, No. 6, pp. 555-560, London, September 1916 (4 pp. in Institute Bulletin).

This was the subject of an address by the author who is president of the Agricultural section of the British Association.

In the development of British agriculture there have been three great lines of progress: (a) the introduction, usually from Flanders, of crops which had not previously been grown on British farms, (b) the removal of obstacles which prevented crops from making as full growth as they might, and (c) the introduction of new methods for increasing the growth of the plant.

Increased yields per acre.—The main obstacles to increased plant-growth lie in the climate and in the soil. Climate apparently cannot be altered; we have to adapt ourselves to it by growing crops and varieties suiting to the conditions that happen to obtain. Soil can be altered, and it is possible to do a good deal in the way of changing it to suit the crops that are wanted ed.

On *light* soil the two great obstacles to be overcome are the lack of water and the poverty in plant nutrients. The problem can be dealt with by increasing the depth of soil through which the roots can range, or by adding the necessary colloidal substances —clay, marl, or organic matter. As regards depth of soil, where a thin layer of rock separates the top soil of sand from a great depth of sand below, improvement can be effected by removing the rock—a cheap method being possibly the use of high explosives available at the end of the war; to prevent reforming of the rock occasional deep ploughing must be carried out. The process of adding marl to sand has disappeared in England on account of transit difficulties; the usual methods are to add organic matter either by dressings of farmyard manure, by feeding crops to sheep on the land, or by ploughing crops and crop residues straight into the soil; the addition of organic matter must generally be accompanied by the addition of lime or limestone (otherwise the soil may become sour) and all the plant nutrients—nitrogen, potash and phosphates—as well as by constant cultivation to keep down weeds and retain soil moisture. When all this is done, light soils become very productive; they will grow almost any crops, and they can be cultivated easily and at almost (but not quite) any time. On account of the costs of the above processes crops must be grown which bring in a high money value—potatoes, greens, peas, sugar-beet, or two crops in a season—although the money-finding crop need not be taken very often. The best hope for improvement of light soils lies in increasing the number of money-finding crops, improving the methods of growing them and the relation to the other crops or the live stock, and improving the organization for disposing of them, so that farmers will feel justified in spending the rather considerable sums of money without which these light soils cannot be successfully managed.

Heavy land can be improved by liming or chalking followed by drainage. Mole drainage promises to be an efficient and much cheaper substitute for the old system of draining, but co-ordination and a certain amount of control over the whole drainage area is needed, it being undesirable that a great fundamental improvement should be at the mercy of individuals. The cultivation of clay land is always risky, however as it is suited only to a limited number of crops, and it is difficult to cultivate, and hence most men lay down this land to permanent grass. The risk can be reduced:

(a) By quicker ploughing in autumn so as to bring the work well forward; this seems only possible by the use of the motor plough. Dr. Russell believes that motor ploughs and cultivating implements will play a considerable part in the improvement of heavy land.

(b) By keeping up the supplies of organic matter in the soil; the simplest plan seems to be the adoption of the North Country system, in which the land is alternately in grass and in tillage. Dr. Russell thinks that demonstrations on such lines in heavy-land districts would resolve many of the farmers' doubts as to the advisability of breaking up some of their grass land.

There will always be some grass on the clays and this must be improved—in most cases by basic slag—with possibly further treatment of the improved herbage.

Loams present no special difficulties. The crop may be hampered by lack of root loam, in which case periodical deep ploughing or subsoiling may bring about a substantial improvement; sub-soiling at Rothamsted at a cost of about $5.00 per acre was followed by an increased yield per acre of 10 cwt. of potatoes, worth $8.50.

All the above soils can next be further improved by proper treatment with fertilizers There comes a point, however, where further increases in fertilizer dressings cease to be effective because the plant cannot grow any bigger, or it cannot stand up any longer, or its resistance to disease is weakened; here, therefore, new varieties must be found that can grow bigger or stand up better or are more resistant to disease. Dr Russell anticipates considerable improvements from a closer coordination of crop variety and soil and climatic conditions.

Reduction of Cost per Acre and Increase of Certainty of Production—One of the most hopeful ways of attacking this problem is to increase the efficiency of the manurial treatment; the whole of the fertilizing constitutents applied to the soil are never recovered in the crops, but by arranging a proper rotation, and by using a properly balanced manure the loss can be much reduced. As regards this latter point Dr. Russell pleads for agreement between the county authorities as to a uniform scheme after the war in their manurial experiments.

Economy is also possible in the management of farmyard manure, the production of which is estimated at 37 million tons annually, valued at $46,000,000, compared with an annual consumption of $32,000,000 worth of artificials.

Further saving is possible in the soil itself; where there is no crop there is a loss of valuable nitrates over the winter, the heaviest loss occurring in the best manured land. This emphasizes the need for spring dressings of quick-acting nitrogenous manures, and accounts for the marked improvement that set in on many soils when spring dressings are given. A good way of getting round the difficulty is to sow a catch crop in autumn and either to plough it in before the main crop is sown or to feed it to stock, whichever is more convenient. Wibberley has discussed several schemes of continuous cropping which give a succession which cover the land at the critical time when losses occur. Our implement makers are steadily increasing the number and effectiveness of the implements for the purpose, while motor traction promises also to increase the speed of working.

Dr. Russell next dealt with the improvement possible in cultivation which will result from the use of the motor plough or tractor, enabling the farmer to plough just as much as he likes in the autumn, or, if he wishes, to get in a bastard fallow or catch crop; and alluded finally to economy in the choice of crops. The need for accounts was emphasized as enabling unprofitable crops to be replaced by profitable. Swedes, *e.g.*, are invariably grown at a loss at Rothamsted, and Dr. Russell believes this would be found not uncommon in the South of England.

Lastly, there is a factor which operates against increased crop production which Dr. Russell thinks it unreasonable to hope to see entirely abolished, and that is that a farmer has to get his pleasure out of the countryside as well as find his work in it, so that trees, hedges and copses are left, pheasants bred, foxes and hares preserved, and rabbits spared. "It would be wholly unreasonable to expect the farmer to lead a life of blameless crop-production unrelieved by any pleasure, and it would be a social folly of the highest order to make the young farmer exchange the innocent pleasure of an occasional day's shooting or hunting in the country for the night's pleasure in town. . . I think we shall always have to be content with getting less crop-yields than the land might produce because we must always keep up the amenities and the pleasures of the countryside. We must maintain the best equilibrium we can between these somewhat—but not wholly—conflicting interests."

"When we know more about the soil, the animal, the plant, etc., we shall be able to increase our crop-yields, but we shall lose the best of our work if we put the crop-yield first. Our aim should be to gain knowledge that will form the basis of a true rural education, so that we may train up a race of men and women who are alive to the beauties and the manifold interest of the countryside, and who can find there the satisfaction of their intellectual as well as their material wants. If we can succeed in that, we shall hear far less of rural depopulation; instead we may hope for the extension of that type of keen healthy countryman which has always been found among the squires, farmers, and labourers of this country, and we believe was already increasing before the war. With such men and women we can look forward with full confidence to the future."

AGRICULTURAL INDUSTRIES

1319—Arsenate of Lead in Viticulture.—MUTTELET, C. F., in *Annales des Falsifications*, Year 9, No. 84-95, pp. 298-301. Paris, August-September 1916 (2 pp. in Institute Bulletin).

1327—New or Interesting Mushrooms in England.—GROVE, W. B., in *The Journal of Botany British and Foreign*, Vol. LIV, No. 643, pp. 185-193; No. 644, pp. 217-223, Pl. 542-543. London, 1916.

The author continues to enumerate the new mushrooms and those of note, found in different parts of England, comprising 252 species or varieties. The present contribution, which is the fifth list, registers 40.

PLANT DISEASES

1331—The Appearance of Cryptogamic Diseases in Soils Planted to Potatoes for the First Time, Clean Seed being used.—PRATT, O. A., in Journal of *Agricultural Research*, Vol. VI, No. 15, pp. 573-575. Washington, 1916.

It has generally been assumed by plant pathologists that if disease-free potatoes were planted on new land the resulting product would be free from disease.

Irrigation tracts recently opened up in Southern Idaho have rendered cultivable large regions in every sense new. However, from the beginning of potato growing in the district diseases have appeared each year, and it was mutually assumed that these diseases had been introduced with the seed planted. The diseases most prevalent are wilt (*Fusarium oxysporum* Schlect), blackrot *F. radicicola* Wollenw Jelly-end rot (*Fusarium sp.*), Rhizoctonia or russet scab, powdery dry rot (*F. trichothecioides* Wollenw) and common scab.

The author experimented by planting clean seed potatoes on absolutely new land and on land previously cultivated to oats and lucerne. In the absolutely new land several diseases appeared in the following proportions: *Actinomyces chromogenus*, 9.3 per cent; *Rhizoctonia* 11.6 per cent; *Fusarium* spp. 5.6 per cent; vascular infections 29.3. In the land previously cultivated to oats and lucerne there were observed common scab 4.7 per cent, *Rhizoctonia* or russet scab 2.8 per cent, *Fusarium* spp., less than ½ of 1 per cent and vascular infection 26 per cent.

From the results so far obtained from the experiments the following conclusions are drawn:

(1) Planting clean, seed potatoes on new land does not guarantee a disease-free product.

(2) A smaller percentage of disease may appear in the product when clean seed is planted on lucerne or grain land than when similar seed is planted on virgin or raw desert land.

1333—A Few Diseases of Fodder Grass in Natal.—VAN DER BIJL, A., in the *Agricultural Journal and Small Holder of South Africa*, Vol. IV, No. 20, pp. 37-39. Johannesburg, 1916.

1336—Researches on the Blight of Plantlets, Especially of the Brassicae.—KYROPOULES P., in *Centralblatt fur Bacteriologie, Parasitenkunden und Infectionskrankheiten*, Vol. 45, Nos. 6-12, pp. 224-256. Jena, 1916.

1339—Xanthium Canadense, a New Weed in Southern Australia.—The Journal of *the Department of Agriculture of South Australia*, Vol. XIX, No. 10, pp. 898-900. Adelaide, 1916.

1340—Echium Vulgare and Phytolacca Octandra, Weeds in New Zealand.—ATKINSON, EDMOND, in *New Zealand Department of Agriculture, Industries and Commerce. The Journal of Agriculture*, Vol. XII, No. 5, pp. 381-385. Wellington 1916.

Description of: (1) viper's bugloss (*echium vulgare* L.) widely distributed throughout New Zealand, and especially abundant in the province of Marlborough. It is an aggressive weed of pastures, particularly when the soil is loose and dry; cattle refuse to eat it. (2) Inkweed (*phytolacca octandra* L.) particularly abundant in the north. It is one of the most conspicuous weeds of the Auckland Province. The plant is introduced into new localities by birds.

INJURIOUS INSECTS

1350—Enemies of the Grape in Ontario.—CEASAR L. and HOWITT J. E., in *Ontario Department of Agriculture, Fruit Branch*, Bulletin 237, pp. 39-48. Toronto, 1916.

The first of the two authors treats of insects attacking grapes in Ontario, describing them briefly and indicating the appropriate means of combatting them.

The second author deals with grape diseases in the province. Nearly all diseases of the grape are found in Ontario vineyards, but fortunately it is very seldom that any disease causes serious loss over any large area of the grape growing districts. However in the past there have been severe epidemics of black rot and frequent local outbreaks of downy and powdery mildew.

1351—Invasion of Field Mice and the Natural Causes of their Sudden Disappearance in the District of Ouman, Russia.—ROSSIKON, K. W., in The *Agricultural Gazette*, Nos. 31, 32, 33, 35. Petrograd, 1916.

AGRICULTURAL TRAINING FOR PARTIALLY DISABLED BELGIAN SOLDIERS

In organizing technical training for the seriously wounded the Belgian government has acted on the principle that an injured man should, whenever possible, not run the risk of becoming a dead weight on the resources of his country, but should still be an appraisable asset, even—in some cases—an element of prosperity. It has therefore been decided to compel the partially disabled to undergo a technical training, suited to the nature of their injuries, the trade they have previously followed, and the tastes and aptitudes which may be discovered in them.

In August, 1915, the work of installing the Belgian Military Institute for the Technical Training of the Seriously Wounded on the land of Notre-Dame-de-la-Mère, 4½ miles from Vernon (Eure), was begun.

Huts which can be taken to pieces and are of uniform pattern are distributed in three rows separated by well metalled roads They cover an area of 4 acres and accommodate more than 1,200 men, including the permanent staff of the school. The number accommodated will be raised to 2,000.

The work necessitates a variety of plant and of labour: for the roads which have to be made a quarry has been opened, and its stone is transported by a Decauville way; land containing too much clay has had to be rendered sanitary; a system of electricity seventy kilometres long, has been established to give light to 1,400 lamps and to feed thirty motor-engines in the various workshops, furnishing altogether 158 horse-power.

The site of the Institute, in the centre of a forest of 875 acres made it possible to make a bargain with the owner for the purchase of the underwood, in the interests of heating, as well as most of the forest trees. There has ensued real forestry enterprise with the accompanying industry and machinery, and considerable quantities of stakes have been secured.

Forty-eight different trades are taught, each by a practical workman and demonstrators. In addition to the practical work two hours a day are devoted to courses and technical explanations, given by specialists who, like the overseers, are themselves soldiers, oftenest unfit for service by reason of wounds or their health.

Among the trades taught which are connected with agriculture are carter's work, smith's work, the mending of agricultural machines, harness-making, basket-making, the making of packing-cases.

Some acres of uncultivated and clayey land have been given up to vegetable growing on a large scale, and it has been necessary to dig, drain and clean these. Heavy manuring and numerous agricultural expedients have produced good returns. A vast kitchen-garden has also been formed, its beds bordered by ready-grown fruit-trees.

Outside the central premises of the Institute, in which only some hectares of land admit of cultivation, a farm of some twenty hectares at a short distance has been rented; and there the scientific succession of crops, which plays so large a part in kitchen-gardening, is practised, and some good meadows allow a certain number of carefully selected milch-cows to be kept.

The average number of wounded men undergoing agricultural or horticultural training is seventy. They are given experience, successively and in order, of all forms of indoor and outdoor work. They are especially trained to prepare and pack vegetables, which are produced largely above the needs of the establishment. At the end of August, 1916, the growing vegetables were valued at some $7.600.

The training given in keeping regular accounts should be noted; for it is of capital importance to each of the trades taught in the Institute, where the whole industrial enterprise aims at the sale of products, manufactured and other.

Every wounded man receives 0.05 franc per working hour from the time of his arrival, by way of encouragement. Each trade is however divided into an apprenticeship and a productive section, and when a man is fit to pass into the latter his wages increase progressively until they reach or even surpass the level of those of uninjured workmen in the same trade. "These productive sections," says the technical director in his report, "have brought in more than $124,000 for manufactured articles. The importance of keeping accounts can be estimated when it is stated that the turnover for the past year was $190,000."

Finally we note that an agricultural orphanage has just been established, in which orphans of the war will enjoy conditions analogous to those of the partially disabled men, receiving a practical and technical agricultural training.

DEPARTMENT FOR CIVIL AND MILITARY VEGETABLE GARDENS IN FRANCE

This department was recently set up within the Ministry of Agriculture, united to the Ministry of War, and was placed under the direction of R. Maxime Ducroq, president of the enterprise for workmen's gardens at Lille. Its chief object is to provoke and encourage the formation of vast vegetable gardens on the abandoned lands:

(1) By means of the depots of army crops and their sections, the sentry-posts of territorials guarding roads and communications, and the hospitals and other military establishments, in which men are retained by their duties and whence they cannot be sent away on leave or for agricultural employment, but where none the less they dispose daily of some hours of leisure;

(2) By means of the civil population of large towns and the neighbourhoods of these.

In 1916, 5,622 military vegetable gardens having an approximate total area of 5,000 acres and able to yield about $2,600,000 a year were formed by these means.

In order largely to develop this first success, a staff of seventy mobilized men has been instructed at the Ministry of Agriculture and has been commissioned to go through all France, encouraging by lectures, advice and other measures the gardening by depots; and it is hoped that the existing number of gardens will thus be multiplied by five or even ten in 1917.

Besides vegetable gardens it was recommended that military piggeries should be instituted, in order to utilize greasy water and other waste food. Almost all the depots now keep pigs in this way, and some of them constantly have in their sites about a hundred pigs, the meat of which does not cost them more than 11 cents a pound.

The civil vegetable-gardens have also acquired a considerable importance. Nine recently formed committees share the task of cultivating the lands attached to the fortifications of Paris in which 3,500 gardens have been established. But the number of applications is much above this figure, and the project was conceived of causing some of the abandoned lands in the neighbourhood of the city to be cultivated by the population of Paris. A meeting of the mayors of the communes of the department of Seine was therefore held at the Ministry of Agriculture on 22nd February, 1917, and was followed by the formation of several local organizing committees. Already analogous committees have been formed in a certain number of these communes to distribute their uncultivated lands among their inhabitans. One of them has distributed 300 gardens, of 300 square metres each, to as many necessitous families.

The movement is spreading to the large provincial towns. Some of them have resumed on a far larger scale the culture which they undertook in 1916 at the expense of the municipality, and they have without exception obtained the best results.

Further by the despatches of 30th December, 1916 and 19th January, 1917, the Minister of War decreed that a certain number of mobilized men should in each district be commissioned for three months in the year to provoke and encourage the formation and development of military vegetable gardens.

These mobilized men went through a course at the Ministry of Agriculture which ended on 4th February, 1917, and then departed to their districts where most of then at once began work.

Since the despatches mentioned were variously interpreted, in some districts the minister specified their intention as follows:

(1) Each of the men concerned, except such as have been noted as unsuitable by the Ministry of Agriculture and therefore replaced, should receive as soon as he reaches his district, from the general commanding it, an order allowing him to go and come freely within its limits. The three months for which he is commissioned start on the day on which this order is remitted to him.

(2) From the date on which this order is remitted to him the lecturer is under the orders only of the general or generals to whose subdivisions he has been assigned, is in direct correspondence with them, and addresses his reports to them directly.

(3) For the time for which he is commissioned the lecturer must not be expected to render other service.

(4) In every place lectures must be delivered to the chiefs of united units and not to each unit separately, and must precede the visits to the various military formations.

(5) With a view to these visits a lecturer is supplied without delay with a complete list of the military units, detachments and establishments within the district assigned to him.

In virtue of a decision of the Minister of War on 18th February, 1917, the head of the Department of Civil and Military Vegetable Gardens at the Ministry of

Agriculture has been entrusted with the local control of the execution of instructions applicable to military vegetable gardens, the verification of results obtained, and the superintendence of the military lecturers commissioned for the relevant work of propaganda.

SETTLING DISCHARGED SOLDIERS ON THE LAND IN NEW ZEALAND

In New Zealand the problem of helping the discharged soldier over the period of transition from military to civil life has been attacked with commendable promptness and thoroughness. At the outset, owing to the novelty of the work and the necessity of improvising the entire machinery, many difficulties had to be faced. The Dishcarged Soldiers' Information Department, the department of State specially formed to deal with the matter, has however surmounted most of these difficulties and the work is now organized on a satisfactory basis.

According to the first report of the department, which was issued in May, its procedure is, briefly, as follows. The names, addresses and other general particulars as to returning soldiers are collected before the transports reach the landing ports and are registered on cards. The cards are then sorted according to the various districts and a confidential schedule is sent to a local committee. When the soldier is eventually discharged from military service he is interviewed by an officer of the department who reports any particulars which are likely to be of use in finding him employment. With the assistance of the local committee a determined effort is then made to secure employment for those who require it.

The employment of soldiers on the land naturally forms an important part of the work of the department. To meet the case of soldiers who have had no experience in farming, arrangements have been made with the Department of Agriculture to undertake the training of a limited number of men on the various State farms in general farming, dairy farming, fruit farming, poultry and bee-keeping, etc. It was thought that partially disabled men in receipt of pensions might reasonably be expected to desire to take up small sections under the land settlement scheme, for the purpose of poultry raising and other light branches of farm work, and that in these cases a course of practical instruction would often save loss of time and money and consequent discouragement. Up to the present time the opportunities afforded have not been taken advantage of; the men—almost without exception—desiring employment of an immediately remunerative character.

State assistance to New Zealand soldiers wishing to settle on the land is however by no means confined to courses of instruction. By an Act passed in October, 1915, and entitled the Discharged Soldiers' Settlement Act, 1915, a discharged soldier is given a number of advantages. Under this Act land may be taken up in two ways. Crown or settlement land may be set apart for selection *only* by discharged soldiers, or it may be disposed of to them under special conditions. In either case the Department of Lands is empowered to remit—wholly or in part and for such periods as it thinks fit—any rent payable by a discharged soldier, or may postpone the date for the payment of the rent. When held under special conditions the soldier may receive financial assistance to enable him to bring his farm into such a state that he can make a living from it.

Land may be disposed of to discharged soldiers either by way of sale or by lease. When sold the price is fixed by the Land Board. If disposed of on terms of deferred payment the purchaser has to pay a deposit of 5 per cent of the purchase money, the balance being paid in equal annual instalments with interest at 5 per cent. When let the term may be up to sixty-six years with a perpetual right of renewal for further successive terms. The rent will be determined by the board and is not in any case to be more than 4½ per cent of the capital value of the land. The lessee may at any time during the continuance of the lease acquire the fee simple of the land.

Under section 6 the Minister of Lands may assist an applicant in the clearing, fencing and general improvement of the land, the erection of buildings, and the purchase of implements, stock, seed, trees and any other things which may be deemed necessary for the successful occupation of the land. The rate of interest is to be fixed by the minister, but in cases of hardship he has power to dispense wholly or in part with the payment of interest. The total of the advances made to one person is not to exceed £500. No land let or sold to a discharged soldier under the Act can be transferred until the expiry of ten years from the date of the sale or the beginning of the lease.

According to the first report on the working of the Act 500,000 acres of land have been provisionally set apart for discharged soldiers. Of this area 67,855 acres have formally been proclaimed under the

Act. It has been decided to cut up some blocks of land into suitable sections and, before finally settling soldiers on them, to effect such improvements as will enable selectors to make a living off their sections. As far as possible soldiers will be employed in effecting these improvements. For fruit farming it has been decided to plant areas with fruit trees, particularly apples.

CONTENTS OF THE INSTITUTE ECONOMIC BULLETIN

In addition to those already dealt with herein, the following is a list of the more important subjects treated in the March number of the International Review of Agricultural Economics. Persons interested in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted.

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AGRICULTURAL STATISTICS

FOREIGN CROP CONDITIONS

THE June number of the Bulletin of Agricultural Statistics gives details of crop conditions on the first of June. In France the weather greatly improved during May and vegetation had almost made up for lost time which had during the earlier months rendered it so backward, and growth was rapid. Increased warmth and rains of the latter half of May in Great Britain and Ireland greatly improved the prospects of all crops. The outlook for wheat, however, could only be described as moderate. The area under wheat in England and Wales is about 8 per cent. less than last year's, and that under oats is about 9 per cent greater. In Italy the weather in May was very favourable for the crops. The weather in Holland was very dry during May and on the first of June the condition of winter wheat was bad to average, rye was average to good, barley bad to average, and the oat crop was developing well. In Switzerland winter crops were below average and spring crops normal.

According to the July crop report of the United States Department of Agriculture, the indicated production of wheat in that country is 678,000,000 bushels compared with 639,886,000 in 1916. The prelimina-ary estimates for other crops are: barley 214,000,000 bushels against 181,000,000 last year; potatoes 452,000,000 against 285,000,000; corn 3,124,000,000 against 2,583.241,000, and flaxseed 17,000,000 against 15,500,000.

Broomhall's latest crop cable issued July 17th is as follows:

Russia.—Weather is clear and warm and in parts intensely hot, and crops are suffering from dryness. The outlook for winter crop is fair, and spring moderate. Interior movement of grain light, and port stocks practically nothing.

France.—Weather fine, being mostly clear and warm. Harvesting is progressing favourably in the South. In the north dryness prevails, but not to any great extent. Local offers are light and mills operating slowly. Foreign arrivals of wheat liberal, and flour increasing.

Scandinavian Peninsula.—Crop promises small as winter was bad and spring cool and wet. Scarcity of supplies is pronounced and import needs large. Prices very high.

Germany.—All neutral advices and otherwise confirm an unfavourable crop outlook for wheat and oats, owing to heavy winter freezing and spring coldness, with heavy moisture. A yield 40 per cent of normal is frequently heard.

Balkan States.—Harvesting is progressing, and generally speaking from advices as confirmed crops are turning out well. Bulgaria and Roumania are shipping new wheat overland.

Italy.—Parts wet and other parts dry. Harvesting is late, as weather is unfavourable and labour scarce. Estimates point to a moderate yield of fair quality. Importation is slow and needs are urgent.

United Kingdom.—Weather fine; some reports of dryness. Outlook for wheat moderate and other vegetation excellent. Import arrivals of wheat liberal.

India.—Weather favourable with recent monsoon generous. Native food grain abundant. Movement of wheat good and shipment liberal.

Australia.—Crop outlook fair and weather more favourable. Wheat movement liberal and stocks large.

North Africa.—Harvesting Prospects fair.

Spain.—Crops benefitted by recent rains. Harvesting is progressing in the south, and fair yield expected. Stocks light.

PRODUCTION, TRADE AND CONSUMPTION OF OATS, BARLEY AND RYE IN CERTAIN COUNTRIES FOR THE YEARS 1916-17 COMPARED WITH THE FIVE YEAR PERIOD BEFORE THE WAR

(Data abstracted from the "Statistical Notes" of the International Institute of Agriculture, March, 1917).

THE accompanying tables I to VI show separately, on the one hand the consumptive requirements of the importing countries, and on the other the quantities it is estimated can be spared for export to supply these requirements. In each case the data for 1916-17 are compared with the corresponding data for the five-year period immediately preceding the war, namely 1909-10 to 1913-14.

The grain carried over from the crop of 1915 remaining as a surplus on August 1, 1916, is not given for all the countries and especially the importing countries. In this case it is not of great importance, but the carry-over of the exporting countries for the record crops of 1915 has been so large that it effectively influences the situation and these exportable surpluses are shown in the tables.

Oats.—The Institute bases its calculations on a normal increase of population, and consequently estimates normal consumption for 1916-17 at figures in some cases considerably higher than the average consumption for the pre-war period. This basis is probably reliable for the United States but not for Canada, owing to war conditions which have had the effect of decreasing the population or maintaining it at an equilibrium, whereas the Institute estimated it for 1916 at 8,368,000. In Canada, assuming a human population of 8,000,000 inhabitants, with the number of horses approximately 3,000,000, the normal consumption in 1916 would probably be about 320,000,000 bushels, and there would be a surplus for export and carry-over of 107,986,000 bushels. The Institute estimates 22,000,000 bushels for export. As a matter of fact, for the 11 months August 1, 1916, to July 1, 1917, Canada exported 50,000,000 bushels. Assuming the exports for July will equal those for June, namely 7,000,000 bushels, we shall have for the full year a total of 57,000,000, leaving a balance for carry-over into the new grain year beginning August 1, 1917, of 50,000,000 bushels.

The corresponding amount for the United States, 1,148,128,000 bushels, estimated by the Institute as normal consumption for 1916-17 is probably rather under than over the reality. That total would leave a balance for export and carry-over of 341,000,000 bushels. It appears from the official figures that the exports for the 11 months have only amounted to 78,000,000 bushels, which would leave the large amount of 263,000,000 bushels as carry-over.

The quantities of oats, therefore, available for export (Table II) are more than sufficient to supply the needs of the importing countries (Table I). It is, however, to be borne in mind that the comparatively shorter and cheaper North Atlantic route favours the shipment of grain from this continent. Moreover, in the present calculations neither does the Institute nor do we take into account the requirements of countries outside of Europe which in normal years are considerable.

Barley.—(Tables III and IV). Here the European requirements of 76,000,000 bushels can only be met by this continent to the extent of 37,318,000 bushels. The brewing industry has been so drastically curtailed that the requirements, except for human food, are really under the amount estimated by the Institute. It is not unlikely that, in consequence of the new milling regulations in Great Britain and France a certain amount of barley flour is used with wheat flour.

Rye.—(Tables V and VI). The European deficiency of 47,992,000 bushels can only be met on this side of the Atlantic to the extent of 18,000,000 bushels. As rye is used for bread this deficiency tends to increase the demand for wheat.

TABLE I. OATS—IMPORTING COUNTRIES

COUNTRIES	1916–17				1909–13		
	Crop of 1916	Carry-over on August 1st 1916	Estimated total normal consumption	Deficiency of available quantities	Arevage production for five years 1909–13	Avergae surplus of imports over exports 1909–10 to 1913–14	Average consumption 1909-10 to 1913–14
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Denmark	48,631,000	....	53,773,000	5,142,000	50,343,000	4,293,000	54,636,000
France	267,667,000	....	339,739,000	72,072,000	334,383,000	28,089,000	362,472,000
Great Britain and Ireland	196,231,000	....	253,934,000	57,703,000	194,435,000	62,449,000	256,884,000
Italy	24,543,000	14,148,000	46,997,000	8,306,000	34,775,000	7,671,000	42,446,000
Norway	11,574,000	....	11,769,000	195,000	11,237,000	635,000	11,872,000
Netherlands	20,931,000	....	26,047,000	5,116,000	18,992,000	7,619,000	26,611,000
Switzerland	6,248,000	....	14,492,000	8,144,000	4,500,000	11,730,000	16,230,000
Totals	575,925,000	14,148,000	746,751,000	156,678,000	648,665,000	122,486,000	771,151,000

TABLE II. OATS—EXPORTING COUNTRIES

COUNTRIES.	1916–17				1909–13		
	Carry-over August 1st 1916	Crop 1916	Estimated total normal consumption 1916–17	Surplus for export	Average yield during five years 1909-13	Average surplus of exports over imports 1909–10 to 1913–14	Average consumption during five years 1909–10 to 1913–14
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Canada	76,812,000	351,174,000	405,430,000	22,556,000	326,245,000	15,478,000	310,767,000
United States	237,490,000	1,251,992,000	1,148,128,000	341,354,000	1,064,638,000	4,182,000	1,060,456,000
Argentina (a)	6,244,000	29,912,000	14,233,000	21,923,000	51,063,000	39,093,000	11,970,000
Australia (a)	2,522,000	19,530,000	15,990,000	6,062,000	16,308,000	....	16,308,000
Totals	323,068,000	1,652,608,000	1,583,781,000	391,895,000	1,458,254,000		1,399,501,000

(a) For the countries of the Southern Hemisphere the crops are for 1916-17 and the grain year is the calendar year 1917, the carry over being estimated for January 1st, 1917.

TABLE III.

BARLEY

IMPORTING COUNTRIES

COUNTRIES	1916–17			Five year average 1909-13.		
	Crop of 1916	Estimated total normal consumption	Deficiency of available quantities	Average production for five years 1909–13	Average surplus of imports over exports 1910-11 to 1913–14	Average consumption 1910-11 to 1913-14. 1913–14
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Denmark	22,481,000	26,047,000	1,566,000	24,944,000	129,000	25,073,000
France	39,403,000	50,385,000	10,982,000	48,185,000	6,063,000	54,248,000
Great Britain and Ireand	55,409,000	107,190,000	51,781,000	65,339,000	47,061,000	112,400,000
Italy	10,109,000	10,541,000	432,000	10,105,000	818,000	10,923,000
Norway	3,486,000	6,582,000	3,096,000	3,018,000	4,547,000	7,565,000
Netherlands	2,499,000	11,161,000	8,662,000	3,261,000	11,065,000	14,326,000
Total	135,387,000	211,906,000	76,519,000	154,852,000	69,683,000	224,535,000

TABLE IV.

BARLEY

EXPORTING COUNTRIES

COUNTRIES	Carry-over August 1st 1916	Crop 1916	Estimate for export 1916–17	Average yield 1909–13	Average surplus for export 1909–10 to 1913-14	Average consumption 1909-10 to 1913-14
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Canada	9,094,000	41,318,000	13,136,000	42,742,000	5,466,000	37,276,000
United States (a)	16,764,000	181,000,000	24,182,000	181,877,000	8,295,000	173,582,000

(a) Normal consumption for the United States based on estimated increase of population 186,075,000 bushels; this would leave for export 11,689,000 bushels. Owing to the war the same basis could not be safely used for Canada.

Actual net exports from Canada first 11 months 1916-17: 7,725,566 bushels.

Actual exports from the United States first 11 months 1916-17: 15,783,854 bushels.

TABLE V.

RYE

IMPORTIMNG COUNTRIES

COUNTRIES	1916–17			1909–13		
	Crop of 1916	Estimated total normal consumption	Deficiency of available quantities	Average production for five years 1909–13	Average surplus of imports ever exports 1910–11 to 1913–14	Average consumption 1910-11 to 1913–14
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Denmark	10,787,000	22,117,000	11,330,000	17,775,000	8,193,000	25,968,000
France	35,888,000	46,306,000	10,418,000	49,025,000	3,197,000	52,222,000
Italy	5,342,000	5,736,000	394,000	5,330,000	618,000	5,948,000
Norway	728,000	10,421,000	9,693,000	972,000	10,311,000	11,283,000
Netherlands	12,393,000	23,747,000	11,354,000	16,176,000	11,543,000	27,719,000
Sweden	22,948,000	27,751,000	4,803,000	23,129,000	3,807,000	26,936,000
Totals	88,086,000	136,078,000	47,992,000	112,407,000	37,669,000	150,076,000

TABLLE VI.

RYE.

EXPORTING COUNTRIES

COUNTRIES	Carry-over August 1st 1916	Crop 1916	Estimate for export 1916–17	Average yield 1909–13	Average surplus for export 1909–10 to 1913-14	Average consumption 1909–10 to 1913–14
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Canada	....	2,896,000	707,000	2,189,000	....	2,189,000
United States	(a) 3,933,000	47,383,000	17,341,000	34,916,000	941,000	33,975,000

(a) Normal consumption for the United States based on estimated increase of population 36,030,000 bushels. This would leave for export 15,286,000. Owing to the war the same basis could not be safely used for Canada.

Actual net exports from Canada first 11 months 1916-17: 1,038,450 bushels.

Actual exports from the United States first 11 months 1916-17: 12,580,182 bushels.

IMPORTS OF CEREALS INTO BELGIUM

THE Commission for Relief in Belgium has supplied the Institute with statistics of the importation of grain and flour into Belgium during November and December 1914 and throughout 1915 and 1916. Theses returns include all the importations of the sereals mentioned for the whole period covered. The surplus of imports over exports during 1913 are added for reference.

Products	1913 (Jan. 1st to Dec. 31	1914 Nov. & Dec.	1915 (Jan. 1st to Dec. 31	1916 (Jan. 1st to Dec. 31.
	Bushels.	Bushels.	Bushels.	Bushels.
Wheat	56,638,000	1,274,000	16,083,000	23,538,000
Wheat flour	(1)	272,000	1,311,000	35,000
Rye	5,699,000	....	....	....
Barley	14,724,000	....	11,000	176,000
Oats	8,924,000	....	....	....
Corn	19,411,000	28,000	6,897,000	3,400,000
Rice (cleaned)	40,230,000	9,295,000	104,614,000	133,256,000

(1) Surplus of exports over imports 610,000 barrels.

CABLED CROP REPORT

A caglegram received July 23rd from the International Institute of Agriculture gives the following official data concerning the growing crops.

Crop conditions on July 1st were for wheat good in Spain, average in Italy and Switzerland, medicore in Denmark, Great Britain and Sweden. The condition of rye was good in Spain and Ireland, average in Italy and Switzerland, and mediocre in Denmark and Sweden. The condition of barley was good in Spain, Scotland and Ireland, average in England and Wales, Italy and Switzerland, and mediocre in Denmark and Sweden. The condition of oats was good in Spain, average in Scotland Ireland, Italy and Switzerland, and mediocre in Denmark, England and Wales, and Sweden. Corn conditions were good in Spain, Italy and Switzerland, and the condition of the rice crop was good in Spain, Italy and Japan.

The production of the different crops in Spain is wheat 141,000,000 bushels or 92.6% of the 1916 crop and 112.6% of the average of the five years 1911-15; rye 27,778,000 bushels or 96.3% of last year and 110.5% of the five year average; barley 76,495,000 bushels or 88% of last year and 103% of the five year average.

The cotton crop of India is estimated at 3,423,000 bales of 500 lbs., or 114% of last year's crop and 99% of the five year average.

DIRECTORY OF THE DEPARTMENT OF AGRICULTURE.

Minister..............................The Honourable Martin Burrell.

Private Secretary....................................William Ide, B.A.

Deputy Minister.........................Geo. F. O'Halloran, B.A., B.C.L.

Assistant Deputy Minister and Secretary....Lt.-Col. A. L. F. Jarvis, I.S.O.

Commissioner under The Agricultural Instruction Act..W. J. Black, B.S.A.

Chief Translator..............................C. E. Mortureux, B.S.A.

The Dominion Experimental Farms Branch..Director, J. H. Grisdale, B.Agr.

On the Central Experimental Farm and twenty Branch Farms and Stations distributed over Canada, conducts research and experiments in animal, field, orchard, garden and greenhouse husbandry, distributes superior seeds, analyzes and tests fertilizers and feeding stuffs, studies diseases of plants and administrates ordinances for their control, and demonstrates what are of value.

The Dairy and Cold Storage Branch.........Commissioner, J. A. Ruddick.

Encourages and assists in the development of the dairying industry and the improvement in the storage, transportation, sale and trade in agricultural products; administers the Dairy Industry Act (1914), the Cold Storage Act (1907), and the Cold Storage Warehouse Act (1914)

The Seed Branch................Commissioner, George H. Clark, B.S.A.

Encourages the production and use of superior seed, the production of farm and garden crops, tests seed for farmers and seed merchants and administers the Seed Control Act.

The Live Stock Branch...Acting Commissioner, H. S. Arkell, M.A., B.S.A.

Encourages and assists the development of the live stock industry.

The Health of Animals Branch....Veterinary Director General, Frederick Torrance, B.A., D.V.S.

Administers the Animals Contagious Diseases Act and the Meat and Canned Food Act. Protects Canadian live stock from contagious diseases.

Entomological Branch...Dominion Entomologist, C. Gordon Hewitt, D.Sc.

Conducts investigations on insects in relation to agriculture, encourages the use of methods of prevention and control and administers the Insects and Pests Section of the Destructive Insect and Pest Act.

The Fruit Branch.......................Commissioner, Donald Johnson.

Encourages the development of the fruit industry along commercial lines. Also administers Part IX of the Inspection and Sale Act, relating to fruit and fruit packages.

International Institute of Agriculture..Commissioner, T. K. Doherty, LL.B.

Supplies Institute at Rome statistics and official information respecting agriculture in Canada and prepares for distribution in Canada corresponding information from countries adhering to the International Institute of Agriculture.

The Publications Branch...........Editor and Chief, J. B. Spencer, B.S.A.

Distributes the publications of the Department and edits The Agricultural Gazette of Canada.

The Exhibition Branch...............Commissioner, Col. Wm. Hutchison.

Prepares and takes charge of Canada's building and exhibits at International Expositions.

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